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LIBRARY OF THE
UNIVERSITY OF MICHIGAN

RECEIVED IN EXCHANGE
FROM
Duke Univ. Library

12
4
1

3.15
1.50
1.65

e 6 8
0' 58

…n Bolton

20
15
45
45
90

30
15
45

3.5
28
4.8

4.2

8
4.8
28

Jake Bottom

9.90
3.80
6.10

9.90
3.80
1 0

A

COMPLETE KEY

TO

SMILEY'S

NEW FEDERAL CALCULATOR,

OR

Scholar's Assistant;

IN WHICH THE

METHOD OF SOLVING ALL THE QUESTIONS CONTAINED IN THAT WORK IS EXHIBITED AT LARGE.

DESIGNED

TO FACILITATE THE LABOUR OF TEACHERS, AND ASSIST THOSE WHO HAVE NOT THE ADVANTAGE OF A TUTOR'S AID.

BY THOMAS T. SMILEY,

TEACHER.

Author of an Easy Introduction to the Study of Geography. Also, of Sacred Geography, for the use of Schools.

Philadelphia:
PUBLISHED AND FOR SALE BY GRIGG & ELLIOTT, No. 9,
NORTH 4th St. AND FOR SALE BY BOOKSELLERS AND
COUNTRY MERCHANTS GENERALLY IN THE
SOUTHERN AND WESTERN STATES.

1835.

Eastern District of Pennsylvania, to wit:

******* BE IT REMEMBERED, That on the ninth
L. S. day of May, in the forty-ninth year of the Independence of the United States of America, A. D.
******* 1825, John Grigg, of the said district, hath de-
osited in this office, the title of a book, the right whereof
e claims as proprietor, in the words following, to wit:

"A Complete Key to Smiley's New Federal Calculator, r Scholar's Assistant; in which the Method of Solving all he Questions contained in that Work is exhibited at large. Designed to facilitate the labour of Teachers, and assist hose who have not the advantage of a Tutor's aid. By Thomas T. Smiley, Teacher. Author of An Easy Intro- luction to the Study of Geography. Also, of Sacred Geog- aphy, for the use of Schools."

In conformity to the act of the Congress of the United States, entitled, "An Act for the encouragement of learn- ng, by securing the copies of maps, charts, and books, to he authors and proprietors of such copies, during the times herein mentioned." And also to the Act, entitled, "An Act supplementary to an Act, entitled, 'An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned,' and extending he benefits thereof to the arts of designing, engraving, and etching historical and other prints."

D. CALDWELL, *Clerk of the*
Eastern District of Pennsylvania.

Stereotyped by J. Howe.

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EXPLANATION OF CHARACTERS.

Signs.	Significations.
$=$	Equal; as $20s.=£1$.
$+$	Addition, (or more) as $6+2=8$.
$-$	Subtraction, (or less) as $8-2=6$.
$\times$	Multiplication, (or multiplied by) as $6\times2=12$.
$\div$	Division, (or divided by) as $6\div2=3$.
$: :: :$	Proportionally; as $2:4::6:12$.
$\surd$ or $\sqrt[2]{}$	Square Root: as $\sqrt[2]{64}=8$.
$\sqrt[3]{}$	Cube Root; as $\sqrt[3]{64}=4$.
$\overline{\qquad}$	A vinculum; denoting the several quantities over which it is drawn, to be considered jointly as a simple quantity.

A KEY

TO

The New Federal Calculator.

SIMPLE ADDITION.

EXAMPLES.

(8)
4829
1234
6101
3014
5618
20796

(9)
91769
14678
80032
71897
76989
335365

(10)
876994
213678
482906
809769
376980
2760327

(11)
389261
789794
849798
487697
999996
948219
4464765

(12)
2136784
8297698
8297694
4897695
1234697
7092032
31956600

(13)
3769694
4976082
4569761
8213243
4876962
4876920
31282662

(14)
37856
975
1234
14
5612
2075
16287
64053

(15)
378269
402607
702
1246
2132
45178
10276
840410

(16)
141
5672
82971
34676
1459
427
12
125358

(17) 14
16
23
29
80
31
100
293

(18) 36
97
125
384
1176
1818

(19) 3797
95
2
75
876
9750
14595

(20) 205
20
840
970
367
1001
3403

(21) 365
807
560
25
37
101
1895

(22) 300
75
2
47
33
9784
20150
765091
1075047
1870529

(23) 75960800
225000
140
76185940

PRACTICAL EXERCISES.

(24) 35
21
56

(25) 275
196
471

(26) $
30
12
5
$47

(27) $
50
25
125
216
416

(28) *Miles.*
37
33
40
35
145

(29) *Sheep.*
A's 34
B's 47
C's 54
135

(30) 25
15
40
9
89

(31) 8
15
19
12
54

(32) *bar.* $
400 for 2000
550 2750
950 $4750

MULTIPLICATION.

CASE I.

EXAMPLES.

(8) 3948769768
3
11846309304

(9) 87051298
4
348205192

(10) 976201698769
5
4881008493845

(11) 456978426976
6
2741870561856

(12) 8079698769
7
56560891383

(13) 97698429769
8
781587438152

(14) 28769842369
9
258928581321

(15) 769829769478
10
7698297694780

(16) 5697698976845
11
62674688745295

(17) 7029876956
12
84358523472

(18) 84976876989
12
1019722523868

(19) 9021681409671
12
108260176916052

(20) 4218
2
8436

(21) 7321
3
21963

(22) 87692
4
350768

(23) 95698
5
478490

(24) 10691
6
64146

(25) 31078
7
217546

(26) 109019
8
872152

(27) 900078
9
8100702

(28) 826870
10
8268700

(29) 278976
11
3068736

(30) 12569769
12
150837228

CASE 2.

EXAMPLES.

(34) 39786948
197
278508636
358082532
39786948
7838028756

(35) 4978829
408
39830632
19915316
2031362232

(36) 8735698
5706
52414188
61149886
43678490
49845892788

(37) 84016978
3761
84016978
504101868
588118846
252050934
315987854258

(38) 49569876
4817
346989132
49569876
396559008
198279504
238778092692

(39) 9637842
9078
77102736
67464894
86740578
87492329676

(40) 9786
13
29358
9786
127218

(41) 8475
29
76275
16950
245775

(42) 11271
35
56355
33813
394485

(43) 19004
305
95020
57012
5796220

(44) 76976
489
692784
615808
307904
37641264

(45) 84769
976
508614
593383
762921
82734544

(46) 1978987
4809
17810883
15831896
7915948
9516948483

(47) 9807094
5047
68649658
39228376
49035470
49496403418

CASE 3.

EXAMPLES.

(48) 37|00
2|00
740000

(49) 4870
25|00
24350
9740
12175000

(50) 4087|00
906|000
24522
36783
370282200000

(51) 876956
99|0000
7892604
7892604
868186440000

CASE 4.

EXAMPLES.

(53) 8976 6 53856 8 430848	(54) 7696 9 69264 9 623376	(55) 87698 9 789282 8 6314256	(56) 20784 12 249408 9 2244672
(57) 81207 11 893277 12 10719324	(58) 47696 12 572352 12 6868224	(59) 75687 7 529809 8 4238472	(60) 34075 6 204450 6 1226700

PRACTICAL EXERCISES.

(61) $25 5 $125	(62) 15 4 60	(63) $250 7 $1750	(64) $150 4 $600
(65) $100 25 500 200 $2500	Or thus, 100 5 500 5 $2500		(66) 18175 14 72700 18175 254450

* * *

SUBTRACTION.

EXAMPLES.

(4) 859768 124978 734790	(5) 9076048 7940689 1135359	(6) 532147878 139876956 392270922

(7) 100000	(8) 75381478	(9) 102070845
84321	39040217	19768799
15679	36341261	82302046

(10) 196	(11) 487	(12) 875	(13) 967	(14) 1001
37	96	302	351	487
159	391	573	616	514

(15) 9765	(16) 87696	(17) 455692	(18) 1000000
1307	10091	300120	1
8458	77605	155572	999999

PRACTICAL EXERCISES.

(19) 25	(20) 75	(21) 7896	(22) 4875	(23) 1240	375
8	42	4389	2976	1082	567
					140
17	33	3507	1899	$158	
					Sum 1082

(24) 5487	325	(25) 25	containing 250
2075	750	9	75
	1000		
3412		16	175
	2075 Sum.		

DIVISION.

EXAMPLES OF SHORT DIVISION.

(7) 2)56789768	(8) 3)3729768769	(9) 4)469769876
28394884	1243256256+1	117442469

DIVISION.

(10) 5)849768769
169953753+4

(11) 6)756976874
126162812+2

(12) 7)87694213628
12527744804

(13) 8)80269687
10033710+7

(14) 9)376948769
41883196+5

(15) 11)876956788
79723344+4

(16) 12)4976876946782
414739745565+2

(17) 12)89769762048769
7480813504064+1

(18) 2)3976
1988

(19) 3)8769
2923

(20) 4)47876
11969

(21) 5)8767
1753+2

(22) 6)9698
1616+2

(23) 7)97899
13985+4

(24) 8)80409
10051+1

(25) 9)981021
109002+3

(26) 10)897697
89769+7

(27) 11)9876978
897907+1

28) 12)4967844
413987

PRACTICAL EXERCISES.

(29) 2)12
6

(30) 7)350
50

(31) 8)8736
4)1092
273

(32) 3)3966
1322

LONG DIVISION.

EXAMPLES.

```
(35)  13)875(67     (36)  15)476(31     (37)  18)958(53
          78                  45                  90
          ——                  ——                  ——
           95                  26                  58
           91                  15                  54
           ——                  ——                  ——
            4                  11                   4
           ——                  ——                  ——
```

```
(38) 28)1475(52     (39) 31)4277(137    (40) 37)25757(696
        140                 31                  222
        ———                 ——                  ———
         75                 117                 355
         56                  93                 333
         ——                 ———                 ———
         19                  247                 227
         ——                  217                 222
                             ———                 ———
                              30                   5
                              ——                  ——
```

```
(41)    41)256976(6267          (42)  48)337979(7041
           246                           336
           ———                           ———
            109                           197
             82                           192
            ———                           ———
             277                            59
             246                            48
             ———                            ——
              316                           11
              287                           ——
              ———
               29
               ——
```

(43) 59)997816(16912
59
407
354
538
531
71
59
126
118
8

(44) 98)999987695(10203956
98
199
196
387
294
936
882
549
490
595
588
7

(45) 125)4697680424(37581443
375
947
875
726
625
1018
1000
180
125
554
500
542
500
424
375
49

(46) 396)387690204886(979015668
3564
3129
2772
3570
3564
620
396
2244
1980
2648
2376
2728
2376
3526
3168
358

```
(47) 876)4876020048769(5566232932
     4380
     ----
      4960
      4380
      ----
       5802
       5256
       ----
        5460
        5256
        ----
         2040
         1752
         ----
          2884
          2628
          ----
           2568
           1752
           ----
            8167
            7884
            ----
             2836
             2628
             ----
              2089
              1752
              ----
               337
              ----
```

```
(48) 1478)8769826000402(5933576454
     7390
     ----
     13798
     13302
     -----
       4962
       4434
       ----
        5286
        4434
        ----
         8520
         7390
         ----
         11300
         10346
         -----
            9540
            8868
            ----
             6724
             5912
             ----
              8120
              7390
              ----
               7302
               5912
               ----
               1390
               ----
```

(49) 87696)98769768720497(1126274501
87696

110737
87696

230416
175392

550248
526176

240727
175392

653352
613872

394800
350784

440164
438480

168497
87696

80801

(50) 97680|0000)8976478976|0000(91896
87912

18527
9768

87598
78144

94549
87912

66377
58608

77696

(51) 1476980|00000)4789768214|00000(3242 Ans.
4430940

3588282
2953960

6343221
5907920

4353014
2953960

Rem. 1399054

PRACTICAL EXERCISES.

(52) 45)9847(218
90
84
45
397
360
Rem. 37

(53) 391)1259678(3221
1173
866
782
847
782
658
391
Rem. 267

(54) 148)225476(1523
148
774
740
347
296
516
444
Rem. 72

(55) 25)375(15 bushels.
25
125
125

(56) 75)87735840(1169811
75
127
75
523
450
735
675
608
600
84
75
90
75
15 Rem.

(57) 49850)99700(2
99700

When the divisor is the exact product of any two figures multiplied together.

EXAMPLES.

(61) 5)9756
7)1951+1 1st Rem.
278+5 2d Rem.
×5
25+1=26

(62) 9)8491
9)943+4
104+7×9+4=67

(63) 9)44767
2)4974+1 Rem.
2487

(64) 7)92017
8)13145+2 Rem.
1643+1×7+2=9

(65) 11)55210
9)5019+1
Rem.
557+6×11+1=67

(66) 6)38751
8)6458+3
Rem.
807+2×6+3=15

(67) 12)99876
9)8323
Rem.
924+7×12=84

(68) 12)37967
12)3163+11
Rem.
263+7×12+11=95

PRACTICAL EXERCISES.

(69) 5)3775
5)755
Ans. 151

(70) 12)480
8)40
Ans. 5 ℔

(71) 12)14400
12)1200
Ans. 100

(72) 12)1800
6)150
Ans. 25

(73) 12)396
11)33
Ans. $3

EXAMPLES IN ADDITION, MULTIPLICATION, SUBTRACTION AND DIVISION.

(1) 50
50
100
—25
75 Ans.

(2) 40 10
20 10
2)20 20
Ans. 10

(3) 25000
13000
2)12000
$6000

(4) Bought 8200 Sold 3756
5060 4879
13200 8635
8635
Ans. 4565

(5) 50)2450(49 miles. Ans.
200
450
450

(6) Bought 24 bags, containing 3000 ℔
Sold 15 1736
Remains 9 bags, containing 1264 ℔

(7) Days 365)2920(8 dols. per day.
2920

Yearly income 2920
Spends yearly 1769
Saves per year $1151

◆

COMPOUND ADDITION.

FEDERAL MONEY.

EXAMPLES.

	$	cts.	m.
(2)	46	75	5
	79	37	8
	43	60	0
	97	37	5
	$267	00	8

	$	cts.
(3)	37	68¾
	95	37½
	43	25
	79	56¼
	$255	87½

	$	cts.
(4)	72	62½
	85	87½
	20	12½
	45	18¾
	94	37½
	42	68¾
	79	18¾
	$440	06¼

	$	*cts.*
(5)	54	75
	37	37½
	93	18¾
	149	87½
	503	68¾
	979	12½
	2194	18¾
	$4012	18¾

	$	*cts.*
(6)	29	25
	34	37½
	188	68¾
	265	12½
	1783	18¾
	8579	56¼
	6	87½
	$10887	06¼

	$	*cts*
(7)	1	18¾
	2	50
		87½
		93¾
	1	87½
	2	68¾
		37½
		87½
	1	93¾
	$13	25

	$	*cts.*
(8)	5	00
	18	50
	8	87½
	1	18¾
	14	50
	0	87½
	5	37½
	7	87½
	20	00
	$82	18¾

	$	*cts.*
(9)	1	87½
	1	68¾
	0	43¾
	1	37½
	0	93¾
	0	56¼
	0	37½
	0	31¼
	0	12½
	$7	68¾

STERLING MONEY.

EXAMPLES.

	£	*s.*	*d.*
(2)	7	9	4½
	13	7	6¾
	4	5	2
	10	18	10¾
Ans.	36	1	0

	£	*s.*	*d.*
(3)	4	6	4
	47	19	7
	159	5	3
	78	6	11¾
Ans.	289	18	1¾

	£	*s.*	*d.*
(4)	565	3	7
	382	13	5
	592	9	2
	856	17	3
	259	9	8
Ans.	2656	13	1

	£	s.	d.
(5)	142	16	7
	489	3	4
	726	15	9
	573	4	8
	628	12	6
Ans.	2560	12	10

	£	s.	d.
(6)	763	7	4
	39	4	9
	162	17	2
	459	15	0
	473	12	8
Ans.	1898	16	11

	£	s.	d.
(7)	69	18	7
	175	2	6
	1582	19	4
	175	13	9
	143	13	8
	212	0	7
Ans.	2359	8	5

	£	s.	d.
(8)	1776	12	8
	412	16	5
	369	7	2
	469	15	10
	573	19	2
	1987	14	8
	4823	15	11
Ans,	10414	1	10

	£	s.	d.
(9)	985	4	9
	186	13	4
	1569	18	4
	183	0	8
	0	17	4
	0	0	7
Ans.	2925	15	0

AVOIRDUPOIS WEIGHT.

	T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
(2)	7	11	2	16	4	13
	15	7	3	8	16	7
	138	19	1	12	8	13
	42	8	3	19	12	4
	357	6	2	8	3	3
Ans.	561	14	1	7	13	8

	T.	*cwt.*	*qr.*	*lbs.*	*oz.*	*dr.*
(3)	12	16	1	19	15	0
	114	10	2	12	4	13
	72	4	2	24	14	3
	176	15	3	4	15	11
Ans.	376	7	2	6	1	11

	T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
(4)	139	19	3	18	13	10
	1754	10	2	11	2	14
	27	3	0	14	11	0
	0	13	0	0	13	0
Ans.	1922	6	2	17	8	8

TROY WEIGHT.

	lbs.	oz.	dwts.	gr.
(2)	185	2	19	20
	56	9	15	6
	1472	11	2	17
	385	0	8	5
	10	8	7	12
Ans.	2110	8	13	12

	lbs.	oz.	dwts.	gr.
(3)	16	4	18	6
	7	9	11	22
	163	7	12	18
	17	0	13	0
Ans.	204	10	15	22

	lbs.	oz.	dwts.	gr.
(4)	172	11	19	22
	12	4	13	12
	18	5	11	20
	119	11	13	18
	0	0	2	13
	0	10	0	20
Ans.	324	8	2	9

APOTHECARIES' WEIGHT.

	℔	℥	ʒ	℈	gr.
(2)	84	7	6	0	12
	132	5	0	2	0
	16	2	2	2	8
	1427	6	7	0	19
	14	0	6	1	9
A.	1674	10	7	1	8

	℔	℥	ʒ	℈	gr.
(3)	18	0	1	0	12
	175	10	5	0	10
	472	3	1	2	3
	0	11	7	2	0
Ans.	667	1	7	2	5

	℔	℥	ʒ	℈	gr.
(4)	182	3	1	0	0
	12	1	0	2	17
	17	2	4	2	15
	0	10	2	1	19
An.	212	5	1	1	11

LONG MEASURE.

	yd.	ft.	in.
(2)	3	2	11
	1	1	9
	2	0	8
	3	1	10
	2	0	4
	6	2	7
Ans.	20	1	1

	L.	m.	f.	p.	yd.	ft.	in.
(3)	172	2	3	19	2	2	4
	0	0	0	14	1	0	3
	0	1	2	29	0	0	10
	0	0	4	0	0	0	0
	0	0	2	0	0	0	10
	0	0	0	0	3	2	3
Ans.	173	1	4	23	2½	0	6

	L.	m.	f.	p.	yd.	ft.	in.
(4)	462	1	7	29	1	1	10
	0	0	0	11	0	1	10
	4	1	2	28	1	2	9
	0	0	0	13	0	0	0
Ans.	467	0	3	14		0	5

CLOTH MEASURE.

	E. E.	qr.	n.
(2)	72	3	2
	536	2	1
	847	1	3
	1453	0	2
	41	2	0
Ans.	2951	0	0

	E. F.	qr.	n.
(3)	19	2	3
	728	1	2
	142	0	1
	816	0	0
	32	1	2
Ans.	1739	0	0

	yd.	*qr.*	*na.*
(4)	19	2	3
	14	2	0
	32	0	2
	0	3	1
	142	3	2
Ans.	210	0	0

	E. Fr.	*qr.*	*na.*
(5)	143	0	3
	17	2	2
	172	1	1
	182	1	3
	132	3	2
	72	1	1
Ans.	720	1	0

LAND MEASURE.

	A.	*R.*	*P.*
(2)	487	2	17
	25	3	28
	67	0	32
	45	1	16
	26	0	29
Ans.	652	1	2

	A.	*R.*	*P.*
(3)	22	2	0
	700	3	27
	47	0	5
	39	0	0
	47	2	39
	0	3	28
Ans.	858	0	19

	A.	*R.*	*P.*
(4)	132	3	25
	654	0	17
	462	3	25
	16	0	4
	1665	3	38
Ans.	2931	3	29

LIQUID MEASURE.

	hhd	*gal.*	*qt.*	*pt.*
(2)	385	42	3	1
	27	36	2	0
	132	17	0	0
	729	25	0	0
	163	47	2	1
Ans.	1438	43	0	0

	T.	*h.*	*gal.*	*qt.*	*pt.*
(3)	19	2	19	0	0
	45	0	0	1	1
	0	3	17	2	0
	0	0	21	0	1
Ans.	65	1	58	0	0

	T.	*h.*	*gal.*	*qt.*	*pt.*
(4)	862	1	0	1	0
	0	0	32	0	1
	0	0	37	2	0
	0	0	32	1	0
	0	2	0	0	1
Ans.	863	0	39	1	0

DRY MEASURE.

	B.	*p.*	*qt.*	*pt.*
(2)	47	2	4	1
	635	0	3	0
	247	3	0	1
	285	0	2	0
	734	2	5	0
Ans.	1950	0	7	0

	B.	*p.*	*qt.*	*pt.*
(3)	754	2	5	0
	469	0	2	0
	385	2	7	1
	375	0	0	1
	0	3	2	0
Ans.	1985	1	1	0

	B.	*p.*	*qt.*	*pt.*
(4)	144	3	2	1
	0	1	2	0
	0	0	3	1
	462	3	0	1
	72	0	5	1
Ans.	680	0	6	0

TIME.

	Y.	*m.*	*w.*	*d.*	*h.*	*m.*	*sec.*
(3)	172	0	1	0	4	0	52
	0	0	0	0	0	34	18
	15	4	0	5	3	27	0
	0	0	1	3	21	35	18
Ans.	187	4	3	2	5	37	28

	Y.	*m.*	*w.*	*d.*	*h.*	*m.*	*sec.*
(4)	462	4	0	0	5	37	24
	62	0	0	0	11	0	24
	0	0	1	5	0	13	0
	0	6	1	4	13	12	37
Ans.	524	10	3	3	6	3	25

MOTION, OR CIRCLE MEASURE.

	sig.	°	′	″
(2)	2	7	32	16
	0	5	27	24
	1	6	17	13
	0	7	38	24
	4	5	42	19
Ans.	8	2	37	36

	sig.	°	′	″
(3)	5	10	46	38
	0	11	37	18
	1	0	47	12
	0	0	0	18
	2	0	0	52
	1	15	12	23
	0	11	57	29
Ans.	10	20	22	10

	sig.	°	′	″
(4)	0	0	45	0
	1	9	0	18
	0	14	21	34
	2	8	13	54
	4	7	12	19
	0	0	47	32
Ans.	8	10	20	37

APPLICATION.

	$	*cts.*
(1)	375	45
	142	37½
	1375	56¼
Ans.	1893	38¾

	Y.	*qr.*	*na.*
(2)	57	2	0
	29	3	2
	45	1	0
	32	3	1
	38	2	0
	38	2	0
Ans.	242	1	3

	B.	*p.*	*qt.*
(3)	2	2	0
	3	3	5
	3	1	1
	2	0	4
Ans.	11	3	2

	A.	*R.*	*P.*
(4)	142	2	0
	32	3	12
	108	3	18
Ans.	284	0	30

	Y.	*qr.*	*na.*
(5)	15	3	0
	18	1	2
	25	3	2
Ans.	60	0	0

	M.	fur.	p.
(6)	43	3	0
	29	0	34
	57	2	32
	12	3	18
Ans.	142	2	4

	B.	p.	qt.
(7)	756	2	0
	756	2	0
	756	2	0
	854	0	5
	854	0	5
Ans.	3977	3	2

COMPOUND MULTIPLICATION.

EXAMPLES.

FEDERAL MONEY.

	$	cts.
(4)	26	18¾
		6
Ans.	157	12½

	$	cts.	m.
(5)	100	40	4
			10
Ans.	1004	04	0

	$	cts.
(6)	56	18¾
		9
Ans.	505	68¾

	$	cts.	m.
(7)	25	37	5
			8
Ans.	203	00	0

	$	cts.
(8)	565	62½
		12
Ans.	6787	50

ENGLISH MONEY.

	£	s.	d.
(2)	14	6	0¼
			9
Ans.	128	14	2¼

	£	s.	d.
(3)	111	11	10½
			10
Ans.	1115	18	9

	£	s.	d.
(4)	37	6	9½
			5
Ans.	186	13	11½

	£	s.	d.
(5)	56	8	7¾
			9
Ans.	507	17	9¾

AVOIRDUPOIS WEIGHT.

	T.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
(2)	6	14	2	7	5	2
						4
Ans.	26	18	1	1	4	8

	qr.	*lb.*	*oz.*	*dr.*
(3)	3	16	7	8
				10
Ans.	35	24	11	0

	Cwt.	*qr.*	*lb.*
(4)	1	2	6
			10
Ans.	15	2	4

	Cwt.	*qr.*	*lb.*
(5)	4	3	17
			11
Ans.	53	3	19

TROY WEIGHT.

	lb.	*oz.*	*dwt.*	*gr.*
(2)	43	0	8	10
				4
Ans.	172	1	13	16

	lb.	*oz.*	*dwt.*	*gr.*
(3)	113	6	0	6
				6
Ans.	681	0	1	12

	lb.	*oz.*	*dwt.*
(4)	17	9	14
			10
Ans.	178	1	0

	lbs.	*oz.*	*dwt.*	*gr.*
(5)	41	6	18	2
				7
Ans.	291	0	6	14

	lbs.	*oz.*	*dwt.*	*gr.*
(6)	91	4	14	16
				8
Ans.	731	1	17	8

APOTHECARIES' WEIGHT.

	℔	℥	ʒ	℈	*gr.*
(2)	53	10	0	2	12
					9
Ans.	484	6	7	2	8

	℔	℥	ʒ	℈	*gr.*
(3)	17	5	6	1	4
					12
Ans.	209	9	4	2	8

	℔	℥	ʒ	℈
(4)	76	4	1	2
				9
Ans.	687	1	7	0

	℔	℥	ʒ	℈	gr.
(5)	95	1	2	1	11
					11
Ans.	1046	2	3	2	1

LONG MEASURE.

	L.	*M.*	*fur.*	*p.*
(2)	4	2	2	29
				7
Ans.	33	1	3	3

	M.	*fur.*	*p.*	*yd.*	*ft.*	*in.*
(3)	18	3	20	1	2	10
						5
Ans.	92	1	21	3½	2	2

	Deg.	*m.*	*fur.*
(4)	6	40	7
			10
Ans.	66	48	6

	M.	*fur.*	*p.*
(5)	44	6	20
			7
Ans.	313	5	20

CLOTH MEASURE.

	E.E.	*qr.*	*na.*
(2)	37	4	2
			8
Ans.	63	1	0

	E.Fl.	*qr.*	*na.*
(3)	18	0	3
			12
Ans.	217	4	0

	E.Fr.	*qr.*	*na.*
(4)	14	1	3
			9
Ans.	129	0	3

	Yds.	*qr.*	*na.*
(5)	19	1	2
			5
Ans.	96	3	2

	E. E.	*qr.*
(6)	56	3
		9
Ans.	509	2

LAND MEASURE.

	A.	*R.*	*P.*
(2)	19	3	20
			6
Ans.	119	1	00

	A.	*R.*	*P.*
(3)	10	0	33
			9
Ans.	91	3	17

	A.	*R.*	*P.*
(4)	1	3	11
			10
Ans.	18	0	30

	A.	*R.*	*P.*
(5)	63	3	18
			11
Ans.	702	1	38

LIQUID MEASURE.

(2)	*T.*	*hhd.*	*gal.*	*qt.*	*pt.*
	1	2	16	3	1
					10
Ans.	15	2	42	3	0

(3)	*P.*	*hhd.*	*gal.*	*qt.*	*pt.*
	4	1	19	3	1
					5
Ans.	23	0	36	1	1

(4)	*T.*	*h.*	*gal.*	*qt.*
	3	2	50	2
				8
Ans.	29	2	26	0

(5)	*H.*	*gal.*	*q.*	*pt.*
	4	41	0	1
				10
Ans.	46	33	1	0

DRY MEASURE.

(2)	*Bu.*	*pe.*	*qt.*	*pt.*
	1	3	3	2
				4
Ans.	7	2	0	0

(3)	*Bu.*	*pe.*	*qt.*	*pt.*
	110	3	0	2
				4
Ans.	443	0	4	0

(4)	*B.*	*pe.*	*qt.*	*pt.*
	44	0	0	1
				7
Ans.	308	0	3	1

(5)		*P.*	*qt.*
		3	1
			9
Ans.	*Bush.* 7	0	1

TIME.

(2)	*Y.*	*m.*	*w.*	*d.*	*h.*	*min.*	*sec.*
	17	8	2	6	4	40	18
							6
Ans.	106	0	1	2	4	1	48

(3)	*W.*	*d.*	*h.*
	3	5	22
			12
Ans.	46	1	0

(4)	*Y.*	*m.*	*w.*	*d.*
	7	0	4	4
				9
Ans.	63	10	1	1

(5)	*Y.*	*m.*	*w.*	*d.*
	15	2	0	6
				8
Ans.	121	4	2	6

RULE 2.

EXAMPLES.

	£	s.	d.	
(2) Multiply	37	10	6¾	by 48
				6×8=48
	225	3	4½	
			8	
Ans.	1801	7	0	

	$	cts.	m.	
(3).	66	37	5	by 36
				6×6=36
	398	25	0	
			6	
Ans.	2389	50	0	

	$	cts.	m.	
(4)	44	25	3	by 56
				7×8=56
	309	77	1	
			8	
Ans.	2478	16	8	

	$	cts.	
(5)	12	18¾	by 96
			12×8=96
	146	25	
		8	
Ans.	1170	00	

	£	s.	d.	
(6)	45	6	9½	by 120
				12×10=120
	544	1	6	
			10	
Ans.	5440	15	0	

	£	s.	d.	
(7)	96	12	3¾	by 144
				12×12=144
	1159	7	9	
			12	
Ans.	13912	13	0	

	A.	R.	P.	
(8)	47	3	20	by 54
				6×9=54
	287	1	0	
			9	
Ans.	2585	1	0	

	M.	f.	p.	
(9)	48	7	25	by 88
				11×8=88
	538	3	35	
			8	
Ans.	4307	7	0	

	lb.	*oz.*	*dr.*	
(10)	56	9	6	by 84
				$12\times7=84$
	681	9	0	
			7	
Ans.	4772	3	0	

RULE 3.

EXAMPLES.

	$	*cts.*
(2) Multiply	7	$87\frac{1}{2}$
		$11\times4+3=47$
	86	$62\frac{1}{2}$
		4
	346	50
	23	$62\frac{1}{2}$
Ans.	370	$12\frac{1}{2}$

	$	*cts.*
(3)	28	$68\frac{3}{4}$
		$11\times6+2=68$
	315	$56\frac{1}{4}$
		6
	1893	$37\frac{1}{2}$
	57	$37\frac{1}{2}$
Ans.	1950	75

	$	*cts.*
(4)	49	75×3
		12
	597	00
		7
	4179	00
	149	25
Ans.	4328	25

	$	*cts.*
(5)	94	$18\frac{3}{4}\times1$
		10
	941	$87\frac{1}{2}$
		3
	2825	$62\frac{1}{2}$
	94	$18\frac{3}{4}$
Ans.	2919	$81\frac{1}{4}$

	$	cts.
(6)	42	31¼×3
		11
	465	43¾
		5
	2327	18¾
	126	93¾
Ans.	2454	12½

	£	s.	d.
(7)	28	7	6½×1
			4
	113	10	2
			7
	794	11	2
	28	7	6½
Ans.	822	18	8½

	£	s.	d.
(8)	34	8	4¾×1
			11
	378	12	4¼
			6
	2271	14	1½
	34	8	4¾
Ans.	2306	2	6¼

	Cwt.	qr.	lb.
(9)	7	3	22×1
			10
	79	1	24
			5
	397	1	8
	7	3	22
Ans.	405	1	2

	lbs.	oz.	dwts.
(10)	12	5	8×3
			12
	149	4	16
			3
	448	2	8
	37	4	4
Ans.	485	6	12

	M.	f.	p.
(11)	4	6	21×3
			12
	57	6	12
			7
	404	4	4
	14	3	23
Ans.	418	7	27

RULE 4.

EXAMPLES.

$$
\begin{array}{lrl}
 & \$ & \textit{cts.} \\
\text{(2) Multiply} & 1 & 56\frac{1}{2}\times 6 \\
 & & 10 \\
\hline
 & 15 & 65\times 5 \\
 & & 10 \\
\hline
 & 156 & 50 \\
 & & 4 \\
\hline
 & 626 & 00 \\
 & 78 & 25 \\
 & 9 & 39 \\
\hline
\text{Ans.} & 713 & 64 \\
\hline
\end{array}
\qquad
\begin{array}{lrl}
 & \$ & \textit{cts.} \\
\text{(3)} & 2 & 87\frac{1}{2}\times 6 \\
 & & 10 \\
\hline
 & 28 & 75\times 7 \\
 & & 10 \\
\hline
 & 287 & 50 \\
 & & 5 \\
\hline
 & 1437 & 50 \\
 & 201 & 25 \\
 & 17 & 25 \\
\hline
\text{Ans.} & 1656 & 00 \\
\hline
\end{array}
$$

$$
\begin{array}{lrl}
 & \$ & \textit{cts.} \\
\text{(4)} & 4 & 31\frac{1}{4}\times 9 \\
 & & 10 \\
\hline
 & 43 & 12\frac{1}{2}\times 7 \\
 & & 10 \\
\hline
 & 431 & 25 \\
 & & 6 \\
\hline
 & 2587 & 50 \\
 & 301 & 86\frac{1}{4} \\
 & 38 & 81\frac{1}{4} \\
\hline
\text{Ans.} & 2928 & 18\frac{3}{4} \\
\hline
\end{array}
\qquad
\begin{array}{lrl}
 & \$ & \textit{cts.} \\
\text{(5)} & 18 & 93\frac{3}{4}\times 7 \\
 & & 10 \\
\hline
 & 189 & 37\frac{1}{2}\times 5 \\
 & & 10 \\
\hline
 & 1893 & 75 \\
 & & 4 \\
\hline
 & 7575 & 00 \\
 & 946 & 87\frac{1}{2} \\
 & 132 & 56\frac{1}{4} \\
\hline
\text{Ans.} & 8654 & 43\frac{3}{4} \\
\hline
\end{array}
$$

	$	cts.
(6)	25	$43\frac{3}{4}\times 9$
		10
	254	$37\frac{1}{2}\times 7$
		10
	2543	75
		8
	20350	00
	1780	$62\frac{1}{2}$
	228	$93\frac{3}{4}$
Ans.	22359	$56\frac{1}{4}$

	$	cts.
(7)	0	$1\frac{3}{4}\times 6$
		10
	0	$17\frac{1}{2}\times 6$
		10
	1	75×2
		10
	17	50
		2
	35	00
	3	50
	1	00
		$10\frac{1}{2}$
Ans.	39	$65\frac{1}{2}$

	$	cts.
(8)	10	$16\frac{1}{2}\times 9$
		10
	101	65×3
		10
	1016	50
		9
	9148	50
	304	95
	91	$48\frac{1}{2}$
Ans.	9544	$93\frac{1}{2}$

	£	s.	d.
(9)	37	18	$6\frac{1}{4}\times 5$
			10
	379	5	$2\frac{1}{2}\times 7$
			10
	3792	12	1
			3
	11377	16	3
	2654	16	$5\frac{1}{2}$
	189	12	$7\frac{1}{4}$
Ans.	14222	5	$3\frac{3}{4}$

	£.	s.	d.	
(10)	48	14	2½	×9
			10	
	487	2	1	×8
			10	
	4871	0	10	
			4	
	19484	3	4	
	3896	16	8	
	438	7	10½	
Ans.	23819	7	10½	

	£.	s.	d.	
(11)	64	2	8	×5
			10	
	641	6	6	×5
			10	
	6413	6	6	
			5	
	32066	13	4	
	3206	13	4	
	320	13	4	
Ans.	35594	0	0	

	£.	s.	d.	
(12)	58	9	6¾	×6
			10	
	584	15	7½	×9
			10	
	5847	16	3	
			3	
	17543	8	9	
	5263	0	7½	
	350	17	4½	
Ans.	23157	6	9	

	M.	*f.*	*p.*	
(13)	25	3	18	×5
			10	
	254	2	20	×6
			10	
	2543	1	0	×2
			10	
	25430	10	0	
	5086	2	0	
	1525	7	0	
	127	1	10	
Ans.	32170	4	10	

	F.	*in.*	*b.c.*	
(14)	48	4	2	×7
			10	
	483	10	2	×8
			10	
	4838	10	2	×5
			10	
	48388	10	2	
			2	
	96777	9	1	
	24194	5	1	
	3871	1	1	
	338	8	2	
Ans.	125182	0	2	

	Yd.	*qr.*	*n.*	
(15)	22	2	1	×4
			10	
	225	2	2	
			10	
	2256	1	0	×2
			10	
	22562	2	0	
			3	
	67687	2	0	
	4512	2	0	
	90	1	0	
Ans.	72290	1	0	

	Hhd.	*gal.*	*qt.*	
(16)	4	37	2	by 4250
			10	
	45	60	0	×5
			10	
	459	33	0	×2
			10	
	4595	15	0	
			4	
	18380	60	0	
	919	3	0	
	229	48	0	
Ans.	19529	48	0	

APPLICATION.

(1)	(2)	(3)	(4)
$12.50	$1.07	$5.62¼	$1.12½
5	9	12	6
Ans. 62.50	Ans. 9.63	Ans. 67.47	6.75
			4
			Ans. 27.00

	£	*s.*	*d.*	
(5)	0	2	2	by 63
			7	
	0	15	2	
			9	
Ans.	6	16	6	

	$	*cts.*	
(6)	3	87½	by 64
		8	
	31	00	
		8	
Ans.	248	00	

	$	cts.
(7)	0	$15\frac{1}{4} \times 6$
		10
	1	$52\frac{1}{2}$
		10
	15	25
	0	$91\frac{1}{2}$
Ans.	16	$16\frac{1}{2}$

	£	s.	d.
(8)	0	1	3
			12
	0	15	0
			11
Ans.	8	5	0

	$	cts.
(9)	9	10×5
		10
	91	0×6
		10
	910	0
		3
	2730	0
	546	0
	45	50
Ans.	3321	50

	£	s.	d.
(10)	0	9	6 per acre × 5
			10
	4	15	0×2
			10
	47	10	0
			3
	142	10	0
	9	10	0
	2	7	6
Ans.	154	7	6

	$	cts.
(11)	1	$18\frac{3}{4} \times 7$
		10
	11	$87\frac{1}{2} \times 1$
		10
	118	75
		2
	237	50
	11	$87\frac{1}{2}$
	8	$31\frac{1}{4}$
Ans.	257	$68\frac{3}{4}$ prime cost.

Again: $1 37½×7
10

13 75×1
10

137 50
2

275 00
13 75
9 62½

$298 37½ sold for.
$257 68¾ prime cost.

$40 68¾ gain.

COMPOUND SUBTRACTION.

EXAMPLES.

FEDERAL MONEY.

$ cts. m.
(2) From 24 60 7
Take 19 30 0
Ans. 5 30 7

$ cts.
(3) 600 62½
1 75
Ans. 598 87½

$ cts.
(4) 110 18¾
99 10¼
Ans. 11 8½

$ cts. m.
(5) 960 10 2
9
Ans. 960 09 3

$ cts.
(6) 449 62½
1 06¾
Ans. 448 55¾

$ cts.
(7) 1866 00
278 11¾
Ans. 1587 88¼

	$	cts.
(8)	104	06¼
		9¾
Ans.	103	96½

	$	cts.	m.
(9)	4010	14	4
	1011	12	5
Ans.	2999	1	9

	$	cts.
(10)	400	00
	211	12½
Ans.	188	87½

ENGLISH MONEY.

	£	s.	d.
(2)	47	6	7¾
	28	5	10½
Ans.	19	0	9¼

	£	s.	d.
(3)	419	7	6
	227	8	9¼
Ans	191	18	8¾

	£	s.	d.
(4)	1000	11	11¾
	200	9	0
Ans.	800	2	11¾

	£	s.	d.
(5)	1000	2	4½
	60	7	8¾
Ans.	939	14	7¾

AVOIRDUPOIS WEIGHT.

	T.	cwt.	qr.	lb.	oz.	dr.
(2)	18	16	1	16	9	2
	0	19	3	20	0	6
Ans.	17	16	1	24	8	12

	cwt.	qr	lb.	oz.
(3)	9	3	20	2
		2	23	5
Ans.	9	0	24	13

	T.	cwt.	qr.	lb.
(4)	14	10	2	16
	0	0	0	11
Ans.	14	10	2	5

	Cwt.	qr.	lb.
(5)	400	0	0
	2	3	14
Ans.	397	0	14

TROY WEIGHT.

	lb.	oz.	dwt.	gr.
(2)	8	3	0	2
	2	1	18	6
Ans.	6	1	1	20

	lb.	oz.	dwt.	gr.
(3)	106	0	0	15
	10	6	2	20
Ans.	95	5	17	19

	lb.	oz.	dwt.	gr.
(4)	22	0	12	6
	14	6	11	0
Ans.	7	6	1	6

	lb.	oz.	dwt.	gr.
(5)	16	0	0	0
	12	11	10	11
Ans.	3	0	9	13

APOTHECARIES' WEIGHT.

	℔	℥	ʒ	℈	gr.
(2)	48	9	6	1	4
	1	10	0	2	8
Ans.	46	11	5	1	16

	℔	℥	ʒ
(3)	59	1	2
	53	7	5
Ans.	5	5	5

	℔	℥	ʒ
(4)	69	0	0
	14	9	1
Ans.	54	2	7

CLOTH MEASURE.

	yd.	qr.	na.
(2)	950	1	2
	19	2	3
Ans.	930	2	3

	yd.	qr.	na.
(3)	49	0	2
	16	2	1
Ans.	32	2	1

	E.E.	qr.	na.
(4)	66	4	0
	17	0	2
Ans.	49	3	2

	E.F.	qr.
(5)	44	1
	19	2
Ans.	24	2

	E.Fl.	qr.
(6)	963	1
	174	2
Ans.	788	2

		Yd.	qr.	na.
(7)	Bought	17	2	0
	Damaged	2	3	1
	Remains good	14	2	3

	Yd.	qr.	na.
(8)	75	3	1
	0	0	1
Ans.	75	3	0

LONG MEASURE.

	Deg.	m.	fur.	p.
(2)	20	50	4	20
	11	56	0	30
Ans.	8	54	3	30

		M.	fur.	p.	
(3)	Travels first day	43	5	20	
	second do.	32	4	00	
	Ans.	11	1	20	more.

LAND MEASURE.

	A.	R.	P.
(2)	502	2	10
	111	3	9
Ans.	390	3	1

	A.	R.	P.
(3)	69	1	3
	17	3	2
Ans.	51	2	1

LIQUID MEASURE.

	T.	hhd.	gal.	qt.	pt.
(2)	100	1	19	2	1
	99	1	28	3	1
Ans.		3	53	3	0

	Hhd.	gal.
(3)	2	0
	0	29
Ans.	1	34

(4) From 1 pipe of wine, which is 126 gals., subtract 93 leaves 33 gals. of wine. Then from 4 hhds. of brandy subtract 29 gals., leaves 223 of brandy. Then from 2 bbls of beer, subtract 1, leaves 1 barrel, which is $31\frac{1}{2}$ gals.

Answer, 33 gals. wine, 223 gals. brandy, $31\frac{1}{2}$ gals. beer.

DRY MEASURE

	B.	p.	qt.	pt.
(2)	10	0	0	1
	9	2	6	1
Ans.		1	2	0

	B.	p.	qt.	pt.
(3)	695	3	0	1
	589	3	5	0
Ans.	105	3	3	1

	B.	p.	qt.	pt
(5)	600	2	7	1
	146	3	2	1
Ans.	453	3	5	

TIME.

	H.	min.	sec.
(2)	16	29	33
	7	36	44
Ans.	8	52	49

	Y.	m.	w.
(3)	18	11	2
	9	10	3
Ans.	9	0	3

	Y.	m.	w.	d.
(4)	900	0	0	0
	111	6	2	6
Ans.	788	6	1	1

	Y.	m.	w.	d.	h.
(5)	6	0	0	0	0
	1	1	1	1	1
Ans.	4	10	2	5	23

MOTION, OR CIRCLE MEASURE.

	sig.	°	′	″
(2)	9	7	40	8
	7	9	57	19
Ans.	1	27	42	49

	sig.	°	′	″
(3)	10	10	16	12
	7	24	37	59
Ans.	2	15	38	13

	sig.	°	′	′
(4)	11	2	5	1
	9	0	7	2
Ans.	2	1	52	5

APPLICATION.

(1) 6 feet of chain at $2,75 per foot =	$16	50	
A gold ring for	4	50	
Ear-rings	12	00	
	$33	00	whole amount.
Ring	4	50	has been returned.
To receive	$28	50	

		$	cts.
(2) 2 doz. pairs at 75 cts.	=	18	00
16 yds. at 87½ —	=	14	00
28 do. at 22 —	=	6	16
5 pair at 31¼ —	=	1	56¼
Amount		39	72¼
Note delivered		50	00
Must be returned		10	27¾

	A.	*R*	*P.*
(3) 1st tract contains	690	2	16
2d do. do.	400	0	0
3d do. do.	63	3	24
4th do. do.	63	3	24
In the whole	1218	1	24
Sold	200	0	00
Remains	1018	1	24

	£	*s.*	*d.*
(4)	55	6	7
	41	4	6
	75	0	0
Collected	171	11	1
Lost	40	6	0
I have	131	5	1

	Bu.	*p.*		*Bu.*	*p.*		*Bu.*	*p.*	
(5) Bought	400	3	of wheat,	160	0	of rye,	150	2	of oats,
Sold	225	1	do.	37	2	do.	78	3	do.
Remaining	175	2		122	2		71	3	

COMPOUND DIVISION.

EXAMPLES.

(3) \$ *cts.*
3)366 $18\frac{3}{4}$
Ans. 122 $6\frac{1}{4}$

(4) \$ *cts.*
6)384 $87\frac{1}{2}$
Ans. 64 $14\frac{1}{2}+2$

(5) \$ *cts.*
8)496 75
Ans. 62 $09\frac{1}{4}+4$

(6) \$ *cts.*
9)587 $68\frac{3}{4}$
Ans. 65 $29\frac{3}{4}+4$

(7) \$ *cts.*
11)976 $43\frac{3}{4}$
Ans. 88 $76\frac{1}{2}+9$

(8) \$ *cts.*
12)1979 $33\frac{1}{3}$
Ans. 164 $94\frac{1}{3}+4$

(9) £ *s.* *d.*
3)560 9 7
Ans. 186 16 $6\frac{1}{4}+1$

(10) £ *s.* *d.*
5)475 19 $9\frac{3}{4}$
Ans. 95 3 $11\frac{1}{2}+1$

(11) £ *s.* *d.*
8)596 15 $6\frac{1}{2}$
Ans. 74 11 $11\frac{1}{4}+2$

(12) £ *s.* *d.*
12)756 4 $11\frac{3}{4}$
Ans. 63 0 $4\frac{3}{4}+11$

(13) *Cwt. qr. lb.*
5)45 3 27
Ans. 9 0 22+1

(14) *Cwt. qr. lb.*
9)10 0 15
Ans. 1 0 14+1

(13) *Yds. qr. na.*
7)44 1 2
Ans. 6 1 1+3

(16) *Yds. qr. na.*
11)56 3 3
Ans. 5 0 2+9

(17) *M. fur. p.*
12)105 5 22
Ans. 8 6 18+6

(18) *M. fur. p.*
6)45 7 18
Ans. 7 5 9+4

When the divisor exceeds 12, but is the exact product of any two figures in the multiplication table.

(19) \$ *cts. m.*
6)45 66 5
6)7 61 0+5
Rem.
Ans. 1 26 8+2×6+5=17

(20) \$ *cts. m.*
4)98 77 8
11)24 69 4+2
Rem.
Ans. 2 24 4+10×4+2=42

$ *cts. m.*

21)12)77 87 5

8)6 48 9+7

Rem.

Ans. 0 81 1+1×12+7=19

$ *cts.*

(22) 12)283 $68\frac{3}{4}$

9)24 $05\frac{1}{2}$+1

Rem.

Ans. 2 $67\frac{1}{4}$+1×12+1=13

$ *cts. m.*

(23) 12)496 37 5

11)41 36 4+7

Ans. 3 76 0+4×12+7=55 Rem.

£ *s.* *d.*

(24) 4)87 19 $4\frac{1}{2}$

8)21 19 10+2

Ans. 2 14 11+6×4+2=$\frac{26}{8}$ qrs. =$\frac{3}{4}$+2 Rem.

£ *s.* *d.*

25)3)55 4 $7\frac{3}{4}$

7)18 8 $2\frac{1}{2}$+1

Rem.

Ans. 2 12 7+6×3+1=19

£ *s.* *d.*

(26) 8)97 15 $6\frac{1}{4}$

7)12 4 $5\frac{1}{4}$+1

Rem.

Ans. 1 14 11+1×8+1=9

Hhd. gal. qt.

27)7)44 28 2

9)6 22 0+2

Rem.

Ans. 0 44 1+7×7+2=51

Hhd. gal. qt.

(28) 12)150 47 3

10)12 35 1+11

Rem.

Ans. 1 16 0+5×12+11=71

When the divisor exceeds 12, and is not the product of any two figures in the multiplication table.

\$ cts. \$ cts. m.
(31) 78)196 75(2 52 2 Ans.
156

78)4075(52 cts.
3900

175
156

78)190(2 mills.
156

Rem. 34

\$ cts. \$ cts. m.
(32) 97)496 $87\frac{1}{2}$(5 12 2
485

97)1187(12 cts.
97

217
194

23
10

97)235(2 mills.
194

41 Rem.

\$ cts. \$ cts.
(38) 123)376 $81\frac{1}{4}$(3 $06\frac{1}{4}$ Ans
369

123)781(6 cts.
738

43
4

123)172(1
123

49 Rem.

£ s. d. £ s. d.
(34) 87)44 7 6(0 10 $2\frac{1}{4}$ Ans.
20

87)887(10 shillings.
87

17
12

87)210(2 pence.
174

36
4

87)144(1 farthing.
87

57 Rem.

£ s. d. £ s. d.

(35) 148)156 15 $8\frac{3}{4}$(1 1 $2\frac{1}{4}$ nearly, Ans.

148

8

20

148)175(1 shilling.

148

27

12

148)332(2 pence.

296

36

4

147

148

PRACTICAL EXAMPLES.

$ cts. m.

(1) 6)47 87 5

4)7 97 9+1

Ans. 1 99 4+3×6+1=19 Rem.

$ cts. $ cts.

(2) 112)64 $81\frac{1}{4}$(0 $57\frac{3}{4}$ Ans.

100

112)6481(57 cts.

560

881

784

97

4

112)389(3

336

53 Rem.

$ cts. $ cts. m.
(3) 72)56 25(0 78 1 Ans.
100
72)5625(78 cts.
504
585
576
9
10
72)90(1 mill.
72
18 Rem.

$ cts. $ cts. m.
(4) 63)125 00(1 98 4 Ans.
63
63)6200(98 cts.
567
530
504
26
10
63)260(4 mills.
252
8 Rem.

£ s. d.
(5) 4)18 17 6
Ans. 4 14 4½

$ cts. $ cts.
(6) 125)1875 81¼(15 00½ Ans.
125
625
625
125)00081(00 cts.
4
125)325(2 qrs.
250
75 Rem.

£ s. d. £ s. d.
(7) 1000)576 18 9½(0 11 4¼ Ans.
20
1000)11358(11 shillings.
1000
1358
1000
358
12
1000)4305(4 pence.
4000
305
4
1000)1222(1 farthing.
1000
222 Rem.

Gal. qt pt. G. qt. pt.
(8) 89)150 2 1(1 2 1 Ans.
89
61
4
89)246(2 quarts.
178
68
2
89)137(1 pint.
89
48 Rem.

C. qr. lb. C. qr. lb.
(9) 19)9 1 25(0 1 27 Ans.
4
19)37(1 qr.
19
18
28
149
38
19)529(27 lbs.
38
149
133
16 Rem.

* * *

REDUCTION.

FEDERAL MONEY.

EXAMPLES.

(1) $
10
100
Ans. 1000

(2) $
25
100
Ans. 2500

(3) $
387
100
Ans. 38700

(4) *cts.*
25
4
Ans. 100 fourths.

(5)
cts.
50
2
Ans. 100 halves.

(6)
cts.
150
3
Ans. 450 thirds.

(7)
$
50
100
5000
2
Ans. 10000 halves.

(8)
$
25
100
2500
3
Ans. 7500 thirds.

(9)
$
275
100
27500
4
Ans. 110000 qrs.

(10)
$
10
10
Ans. 100 dimes.

(11)
$
220
10
2200 dimes.
10
22000 cts.
10
Ans. 220000 mills.

Note.—When more than one denomination is givei
to be reduced.

(1)
$ cts.
15 15
100
Ans. 1515 cts.

(2)
$ cts.
2 25
100
225 cts.
4
Ans. 900 4ths.

(3)
$ cts.
17 $18\frac{3}{4}$
100
1718 cts.
4
Ans. 6875 4ths.

	$ cts.		$ cts.
(4)	13 27⅓	(5)	426 88½
	100		100
	1327		42688
	3		2
	Ans. 3982 thirds.		Ans. 85377 halves.

ENGLISH MONEY.

	£		*s.*		*s.*		*d.*
(2)	364	(3)	20	(4)	70	(5)	12
	20		12		12		4
	Ans. 7280 *s.*		Ans. 240 *d.*		Ans. 840 *d.*		Ans. 48 *qrs.*

	d.		£ *s.* *d.*		£ *s.* *d.*		£ *s.* *d.*
(6)	26	(8)	18 12 7	(9)	105 13 9½	(10)	36 19 7¾
	4		20		20		20
	Ans. 104 qrs.		372		2113		739
			12		12		12
			Ans. 4471 *d.*		25365		8875
					4		4
					Ans. 101462		Ans. 35503 qrs.

Cents to Pence.

	cts.		*cts.*
(2)	36975	(3)	57697
	9		9
	10)332775		10)519273
	Ans. 33277½ *d.*		Ans. 51927¼+*d.*

Pence to Cents.

(2)
d.
4590
10
9)45900
Ans. 5100 *cts.*

(3)
d.
76975
10
9)769750
Ans. 85527 *cts.* 7 *m.*+7

AVOIRDUPOIS WEIGHT.

(2)
Cwt.
260
4
Ans. 1040 *qrs.*

(3)
qr.
36
28
288
72
Ans. 1008 *lbs.*

(4)
lb.
17
16
102
17
Ans. 272 *oz.*

(5)
oz.
20
16
120
20
Ans. 320 *dr.*

(6)
T. cwt. qr.
5 12 2
20
112
4
Ans. 450 *qrs.*

(7)
Qr. lb. oz.
2 25 10
28
21
6
81 lbs.
16
486
82
1306 ounces.
16
7836
1306
Ans. 20896 drams.

APOTHECARIES' WEIGHT.

℥
(2) 72
8
Ans. 576 drams.

℔
(3) 10
12
120 ozs.
8
960 drs.
3
2880 scru.
20
Ans. 57600 grs.

℔ ℥ ʒ ℈ *gr.*
(4) 15 9 4 2 17
12
189 oz.
8
1516 drs.
3
4550 scru.
20
Ans. 91017 grs.

CLOTH MEASURE.

Yds.
(2) 36
4
Ans. 144 qrs.

E. E.
(3) 20
5
Ans. 100 qrs.

E. Fl.
(4) 16
3
48 qrs.
4
Ans. 192 na.

E. Fl. qrs.
(5) 5 2
3
Ans. 17 qrs.

E. Fr. qr.
(6) 37 2
5
Ans 187 qrs.

Yds. qrs. na.
(7) 19 2 1
4
78
4
Ans. 313 na.

DRY MEASURE.

Pe.
(2) 32
8
Ans. 256 *qts.*

Bu.
(3) 7
4
Ans. 28 *pe.*

Bu.
(4) 12
4
48
8
384
2
Ans. 768 *pts.*

Bu. pe. qt.
(5) 14 0 3
4
56
8
Ans. 451 *qts.*

Bu. pe. qt. pt.
(6) 24 1 2 1
4
97
8
778
2
Ans. 1557 *pts.*

LAND MEASURE.

A.
(2) 132
4
528
40
Ans. 21120 *p.*

A. R. P.
(3) 54 3 23
4
219
40
Ans. 8783

SQUARE MEASURE.

Sq. yds.
(2) 120
9
1080
144
4320
4320
1080
Ans. 155520 *sq. in.*

Sq.yds. s.ft. s.in
(3) 29 2 102
9
263
144
1054
1052
264
Ans. 37974 *sq. in.*

LIQUID MEASURE.

Gals.
(2) 28
4
Ans. 112 *qts.*

Hhds
(3) 5
63
Ans. 315 *gals.*

Gals.
(4) 110
4
440
2
Ans. 880 *pts.*

Tuns.
(5) 6
4
24
63
72
144
1512
4
6048
2
Ans. 12096 *pts*

Hhds. gals. qts.
(6) 7 41 2
63
22
46
482
4
Ans.1930 *qts.*

Gals. qts.
(7) 47 2
4
190
2
Ans. 380 *pts.*

(8)	(9)	(10)
Hhs. gals. qts.	*Tuns hhds. gals.*	*Tun. hhd. gal. qt. pt.*
4 0 3	19 0 27	5 1 15 1 1
63	4	4
252	76 *hhds.*	21
4	63	63
1011	235	68
2	458	127
Ans. 2022 *pts.*	4815	1338
	4	4
	Ans. 19260 *qts.*	5353
		2
		Ans. 10707 *pts.*

LONG MEASURE.

(2)	(3)	(4)	(5)
Yds.	*Po.*	*Fur.*	*Miles.*
48	27	18	34
3	$5\frac{1}{2}$	40	8
Ans. 144 *ft.*	135	Ans. 720 *po.*	Ans. 272 *fur.*
	$13\frac{1}{2}$		
	Ans. $148\frac{1}{2}$ *yds.*		

(6)	(7)	(8)
L.	*M.*	*M.*
108	17	20
3	320 *p.*=1 *m.*	1760 *yds.*=1 *m.*
Ans. 324 *m.*	340	Ans. 35200 *yds.*
	51	
	Ans. 5440 *po.*	

REDUCTION.

Ft.	in.
[illegible]	9
2	

	Yds.	ft.
(11)	37	1
	3	
Ans.	112 *ft.*	

Fur.	po.
[illegible]	29

[illegible] ft. in.
[illegible] 2 10

TROY WEIGHT

(2)
oz.
116
20
Ans. 2320 dwt.

(3)
lb.
25
12
300
20
6000
24
24000
12000
Ans. 144000 *gr.*

(4)
oz. dwt.
29 16
20
Ans. 596 *dwt.*

(5)
lb. oz. dwt. gr.
19 11 14 21
12
239
20
4794
24
19177
9590
Ans. 115077 *gr.*

TIME.

(1)
Min.
30
60
Ans. 1800 *s.*

(2)
hrs.
12
60
Ans. 720 *m.*

(3)
yrs.
12
12
Ans. 144 *m.*

(4)
d. hr. min.
3 5 29
24
17
6
77
60
Ans. 4649 *min.*

L.
(9) 6
3
18
8
144
40
5760
$5\frac{1}{2}$
28800
2880
31680
3
95040
12
Ans. 1140480 *in.*

Ft. in.
(10) 14 9
12
Ans. 177 *in.*

Yds. ft.
(11) 37 1
3
Ans. 112 *ft.*

Fur. po.
(12) 112 29
40
$\frac{1}{2}$)4509
$5\frac{1}{2}$
22545
$2254\frac{1}{2}$
Ans. $24799\frac{1}{2}$ *yds.*

M. fur. po.
(13) 450 6 32
8
3606
40
Ans. 144272 *po.*

L. m. fur. po. yds. ft. in.
(14) 2 1 3 16 3 2 10
3
7
8
59
40
$\frac{1}{2}$)2376
$5\frac{1}{2}$
11883
1188
13071
3
39215
12
Ans. 470590 *in.*

TROY WEIGHT

```
         oz.            lb.          oz. dwt.        lb.oz.dwt.gr.
(2)    116        (3)  25      (4)  29  16     (5)  19  11  14  21
        20             12            20             12
      ----            ---           ---            ---
Ans. 2320 dwt.        300     Ans. 596 dwt.         239
     ----              20           ---              20
                     ----                          ----
                     6000                          4794
                       24                            24
                   ------                        ------
                    24000                         19177
                   12000                          9590
                   ------                        ------
             Ans. 144000 gr.               Ans. 115077 gr.
                   ------                        ------
```

TIME.

```
          Min.             hrs.              yrs.
   (1)    30        (2)    12        (3)     12
          60               60                12
         ----              ---               ---
   Ans. 1800 s.     Ans.  720 m.      Ans.  144 m.
         ----              ---               ---
```

```
                   d. hr. min.
       (4)         3  5   29
                  24
                  --
                  17
                  6
                  --
                  77
                  60
                  --
           Ans. 4649 min.
                ----
```

MOTION, OR CIRCLE MEASURE.

°	*Sig.*	*Sig.* °	*Sig.* ° ′ ″
(1) 24	(2) 4	(3) 11 12	(4) 4 3 18 27
60	30	30	30
Ans. 1440′	120	Ans. 342	123
	60		60
	7200		7398
	60		60
	Ans. 432000		Ans. 443907″

PROMISCUOUS EXAMPLES.

$	*Fur.*	*Days.*	*H. cts.*
(1) 35	(2) 8)98	(3) 7)365	(4) 2)84
100	Ans. 12 *m.* 2 *fur.*	Ans. 52 *w.* 1 *d.*	Ans. 42 *cts.*
Ans. 3500 *cts.*			

Tuns cwt.	*R.*	*S.*	*P.*
(5) 8 15	(6) 63	(7) 2|0)15|7	(8) 4)175
20	40	Ans. £7 17 *s.*	Ans. 43 *bu.* 3 *pe.*
Ans. 175 *cwt.*	Ans. 2520 *sq. per.*		

cts.	*Pts.*	*Sec.*	*Hhd. gal.*
(9) 100)76|42	(10) 2)103	(11) 6|0)72|0	(12) 7 33
			63
Ans. $76 42 *cts.*	Ans. 51 *qts.* 1 *pt.*	Ans. 12 *min.*	
			24
			45
			Ans. 474 *gal.*

Qrs.
(13) 5)100
Ans. 20 *E. E.*

Dwts.
(14) 2|0)10|8
Ans. 5 *oz.* 8 *dwt.*

S.
(15) 2|0)25|0
Ans. £12 10*s.*

3
(16) 7
3
Ans. 21 ℈

s. d.
(17) 8 8
12
Ans. 104 *d.*

Days.
(18) 7)203
Ans. 29 *w.*

Qrs.
(19) 16
4
Ans. 64 *na.*

drs.
(20) 16)74(4 *oz.* 10 *drs.* Ans.
64
10

S.
(21) 13
4
Ans. *threepences* 52

Tuns.
(22) 20
20
Ans. 400 *cwt*

Qrs.
(23) 5)81
Ans. 16 *E. Fr.* 1 *qr.*

Gal. qt. pt.
(24) 21 3 1
4
87
2
Ans. 175 *pts.*

M. fur.
(25) 3 1
8
Ans. 25 *fur.*

Cts.
(26) 1|00)12|35
Ans. $12 35 *cts.*

Days.
(27) 3
24
72
60
Ans. 4320 *m.*

Cts.
(28) 121
4
Ans. 484 *qrs*

lbs.
(29) 13
16
78
13
208
16
1248
208
Ans. 3328 *drs.*

Qrs.
(30) 3)154
Ans. 51 *E. Fl.* 1 *qr.*

Dwts.
(31) 2|0)246|1
12)123+1 *dwt.*
Ans. 10 *lb.* 3 *oz.* 1 *dwt*

Yd. qr. na.
32) 12 2 1
4
50
4
Ans. 201 *na.*

Gals.
(33) 63)584621(4)9279
567
Ans. 2319 *t.* 3 *hhds.* 44 *g.*
176
126
502
441
611
567
44 *gals.*

lbs. oz.
(34) 725 6
16
4356
725
11606
16
69636
11606
Ans. 185696 *drs.*

lbs. *qrs.*
(35) 28)27552(4)984
252
246 *cwt.* Ans
235
224
112
112

£ *s.* *d.*
(36) 5 4 6¼
20
104
12
1254
4
Ans. 5017 *fur.*

Days.
(37) 7)763
Ans. 109 *w.*

£ *s.* *d.*
(38) 85 10 7
20
1710
12
Ans. 20527 *d.*

Grs.
(39) 2|0)122|0
3)61
Ans. 20ʒ 1℈

Qrs.
(40) 5)27
Ans. 5 *E. E.* 2 *qrs.*

Pts.
(41) 2)1357
8)678+1 *pt.*
4)84+6 *qts.*
Ans. 21 *bu.* 0 *p.* 6 *qts.* 1 *pt.*

per.
(42) 4|0)865|4
4)216 +14 *per.*
Ans. 54 *a.* 0 *r.* 14 *p.*

◆

SINGLE RULE OF THREE.

EXAMPLES.

lbs. *lbs.* *cts.* *cts.*
(3) State the question thus: As 2 : 8 :: 50 : 200 Ans.
For 50 × 8 = 400 ÷ 2 = 200 *cts.*

lb. lbs. cts. cts.
1) As 1 : 5 : : 12 : 60
For 12×5=60÷1= 60 *cts.* Ans.

yds. yd. cts. cts.
5) As 10 : 1 : : 550 : 55
For 550×1=550 which ÷10=55 *cts.* Ans.

lbs. lbs. cts. $ cts.
6) As 7 : 122 : : 87½ : 15 25
For 87½×122=10675 which ÷7=$15 25 *cts.* Ans.

bu. bu. cts. $ cts.
7) As 1 : 209 : : 72 : 150 48
For 72×209=15048 which ÷1=$150 48 *cts.* Ans.

lbs. lb. cts. cts.
8) As 5 : 1 : : 55 : 11
For 55×1=55 which ÷5=11 *cts.* Ans.

yd. yds. $ cts. $ cts.
(9) As 1 : 18 : : 4 25 : 76 50
For 425×18=7650 which ÷1=$76 50 *cts.* Ans.

lbs. lb. $ cts. cts.
(10) As 76 : 1 : : 24 32 : 32
For 2432×1=2432 which ÷76=32 *cts.* Ans.

bu. bu. $ cts. cts. m.
(11) As 8 : 1 : : 3 94 : 49 2+4
For 394×1=394 which ÷8=49 *cts.* 2 *m.*+4 Ans.

lb. lbs. cts. $ cts.
(12) As 1 : 57 : : 7½ : 4 27½
For 7½×57=427½ which ÷1=$4 27½ *cts.* Ans.

bu. bu. cts. $ cts.
(13) As 1 : 243 : : 45 : 109 35
For 45×243=10935 which ÷1=$109 35 *cts.* Ans.

lb. lbs. $ cts. $ cts.
(14) As 1 : 147 : : 1 12½ : 165 37½ Ans.
For 112½×147=16537½ which ÷1=$165 37½ *cts.*

lb. lbs. cts. $ cts.
(15) As 1 : 869 : : 4½ : 39 10½
For 4½×869=3910½ which ÷1=$39 10½ *cts.* Ans.

yds. yd. \$ cts. \$ cts.
(16) As 24 : 1 : : 125 24 : 5 21+20 Ans.
For 12524×1=12524 which ÷24=\$5 21 *cts.*+20

C. lb. \$ cts. cts. m.
(17) As 1 : 1 : : 11 50 : 10 2+76
lbs. lb. \$ cts. cts. m.
Or, as 112 : 1 : : 11 50 : 10 2+76 Ans.
For 1150×1=1150 which ÷112=10 *cts.* 2 *m.*+76

lb. lbs. cts. \$ cts.
(18) As 1 : 218 : : 7 : 15 26
For 7×218=1526 which ÷1=\$15 26 *cts.* Ans.

bu. bu. £ s. s. d.
(19) As 57 : 1 : : 30 10 : 10 8¼+39
bu. bu. s. s. d.
Or, as 57 : 1 : : 610 : 10 8¼+
For 610×1=610 which ÷57=10*s.* 8¼*d.*+39 Ans.

oz. lbs.oz. cts. \$ cts.
(20) As 1 : 3 5 : : 72 : 29 52
oz. oz. cts. \$ cts.
Or, as 1 : 41 : : 72 : 29 52
For 72×41=2952 which ÷1=\$29 52 *cts.* Ans.

lb. lbs. cts. \$ cts.
(21) As 1 : 135 : : 10 : 13 50
For 10×135=1350 which ÷1=\$13 50 *cts.* Ans.

C. T. C. £ s. d. £ s. d.
(22) As 2 : 15 3 : : 7 12 6 : 1155 3 9
C. C. d. £ s. d.
Or, as 2 : 303 : : 1830 : 1155 3 9
For 1830×303=554490 which ÷2=277245*d.*= £1155 3*s.* 9*d.* Ans.

s. d. £ s. d. gal. gals.
(23) As 4 10 : 54 7 6 : : 1 : 225
d. d. gal. gals.
Or, as 58 : 13050 : : 1 : 225
For 1×13050=13050 which ÷58=225 *gals.* Ans.

w. w. cts. \$ cts.
(24) As 1 : 52 : : 250 : 130 00
For 250×52=13000 which ÷1=\$130 00 *cts.* Ans.

A. A. R. P. $ cts. $ cts.
(25) As 1 : 34 1 17 : : 42 25 : 1451 55+25
P. P. $ cts. $ cts.
Or, as 160 : 5497 : : 42 25 : 1451 55+25
For 4225×5497=23224825 which ÷160=$1451 55 *cts.*+25 Ans.

gals. gal. £ s. s.
(26) As 131 : 1 : : 65 10 : 10
gals. gal. s. s.
Or, as 131 : 1 : : 1310 : 10
For 1310×1=1310 which ÷131=10*s.* Ans.

$ $ T. T. hhd. gal. qt. pt.
(27) As 754 : 1754 : : 1 : 2 1 19 0 1
For 1×1754=1754 which ÷754=2 *T.* 1 *hhd.* 19 *gal.* 0 *qt.* 1 *pt.* Ans.

s. d. £ s. yds. yds.
(28) As 18 8 : 36 16 : : 7 : 276
d. d. yds. yds.
Or, as 224 : 8832 : : 7 : 276
For 8832×7=61824 which ÷224=276 *yds.* Ans.

lb. cwt. qrs. lbs. cts. $ cts. m.
(29) As 1 : 5 2 17 : : 9½ : 60 13 5
lb. lbs. cts. $ cts. m.
Or, as 1 : 633 : : 9½ : 60 13 5
For 9½×633=6013½ which ÷1=$60 13 *cts.* 5 *m.* Ans.

cts. $ lb. lbs. oz. dr.
(30) As 114 : 354 : : 1 : 310 8 6+84
For 1×35400=35400 which ÷114=310 *lbs.* 8 *oz.* 6 *dr.*+84 Ans.

£ s. £ s. skeins. skeins.
(31) As 2 10 : 105 3 : : 100 : 4206
s. s. skeins. skeins.
Or, as 50 : 2103 : : 100 : 4206
For 100×2103=210300 which ÷50=4206 *sk.* Ans.

yds. yd. $ cts. $ cts. m.
(32) As 39 : 1 : : 350 38 : 8 98 4+ Ans.
For 35038×1=35038 which ÷39=$8 98 *cts.* 4 *m.*

gals. qts. gals. qt. pt. gals. qts. pt.
(33) 61½ *gals.*=61 2+62 1 1=123 3 1
pt. gals. qts. pt. cts. \$ *cts.*
Then as 1 : 123 3 1 : : 37½ : 371 62½
pt pts. cts. \$ *cts.*
Or, as 1 : 991 : : 37½ : 371 62½
For 37½×991=37162½ which ÷1=\$371 62½ *cts.* Ans.

bu. bu. bu.
(34) 75+87=162
bu. bu. cts. \$ *cts.*
Then as 1 : 162 : : 52 : 84 24
For 52×162=8424 which ÷1=\$84 24 *cts.* Ans.

(35) 1 year equals 365 days.
day. days. cts. \$ *cts.*
Then as 1 : 365 : : 187½ : 684 37½
For 187½×365=68437½ which ÷1=\$684 37½ *cts.* the sum he spends in a year; his income yearly is \$1022—\$684 37½ *cts.*=\$337 62½ *cts.* Ans.

cwt. cwt. qrs. lb. \$ *cts.* \$ *cts.*
(36) As 1 : 4 3 24 : : 2 10 : 10 42½
lbs. lbs. cts. \$ *cts.*
Or, as 112 : 556 : : 210 : 10 42½ price of stove.
For 210×556=110760 which ÷112=\$10 42½ *cts.* price of stove.
Then 27 *lbs.*×18¾ *cts.*=\$5 06¼ *cts.* amount of pipe, and 50 *cts.*×2=\$1.00 price of 2 elbows.
+\$10 42½ *cts.*.price of stove.
+\$ 5 06¼ *cts.* do. pipe.
+\$ 1 00 *cts.* do. elbows.

\$16 48¾ Ans.

(37) 14 pair×2=28 single shutters, which ×8½=243 : whole number of sheets used.
sheet sheets. cts. \$ *cts.*
Then as 1 : 243 : : 11½ : 27 37
For 243×11½=2737 which ÷1=\$27 37 *cts.* Ans.

8) If 45 men eat 1 lb. per day each, they will altogether eat 45 lbs. in a day.

lbs. lbs. d. w. d.
Then as 45 : 4500 : : 1 : 14 2
For 1×4500=4500 which ÷45=100 *d.*=14 *weeks* 2 *days*. Ans.

A. R. A. R. P. bu. pe. bu. pe. qts. pt.
39) As 12 2 : 37 3 5 : : 443 3 : 1341 0 7 1
P. P. pe. bu. pe. qts. pt.
Or, as 2000 : 6045 : : 1775 : 1341 0 7 1
For 1775×6045=10729875 which ÷2000=1341 *bu.* 0 *pe.* 7 *qts.* 1 *pt.* Ans.

	$	*cts.*
40) Amount paid for the sugar	204	00
carriage	15	75
storage	18	31¼
and would gain	57	00
	$295	06¼

$295 06¼ the sum the whole must sell for.

C. qrs. C. $ cts. $ cts. m.
Then as 27 2 : 1 : : 295 06¼ : 10 72 9+60
qrs. qrs. cts. $ cts. m.
Or, as 110 : 4 : : 29506¼ : 10 72 9+60
For 29506¼×4=118025 which ÷110=$10 72 *cts.* 9 *m.*+60 Ans.

(41) To find how much per cent. he can pay.

$ cts. $ cts. $ $
As 18284 40 : 9142 20 : : 100 : 50 per cent.
For 100×914220=91422000 which ÷1828440=50 Ans. the first.

To find what the creditor is to receive.

$ cts. $ cts. $ $
As 18284 40 : 9142 20 : : 472 : 236
For 472×914220=431511840 which ÷1828440=$236 Ans.

INVERSE PROPORTION.

m. m. d. d.
(42) As 12 : 6 : : 18 : 9
For 18×6=108 which ÷12=9 *days*. Ans.

m. m. d. d. h.
(43) As 18 : 12 : : 20 : 13 4
For 20×12=240 which ÷18=13 *days* 4 *hours*. Ans.

d. d. m. m
(44) As 4 : 24 : : 8 : 48
For 8×24=192 which ÷8=48 *men*. Ans.

m. m. d. d.
(45) As 48 : 12 : : 24 : 6
For 24×12=288 which ÷48=6 *days*. Ans.

h. h. d. d. h.
(46) As 15 : 11 : : 5 : 3 8
For 5×11=55 which ÷15=3 *days* 10 *hours*. Ans.

ft. in. ft. in. ft. yds. ft. in
(47) As 2 3 : 30 6 : : 48 : 216 2 8
in. in. ft. yds. ft. in.
Or, as 27 : 366 : : 48 : 216 2 8
For 48×366=17568 which ÷27=650$\frac{18}{27}$ *ft.* =216 *yds.* 2 *ft.* 8 *in.* Ans.

d. d. m. m.
(48) As 50 : 100 : : 14 . 28
For 14×100=1400 which ÷50=28 *men*. Ans.

PROMISCUOUS EXAMPLES.

Cwt. Cwt. qrs. lbs. \$ cts.
(49) As 1 : 18 3 19 : : 11 37$\frac{1}{2}$
Cwt. qrs. lbs. lbs.
For 18 3 19=2119 which ×1137$\frac{1}{2}$=2410362$\frac{1}{2}$ the divisor; which ÷1 *cwt.*, that is 112 *lbs.*=\$215 21$\frac{5}{56}$ *cts.* Ans.

\$ \$ \$
(50) 730—22=708
yds. yd. \$ \$ cts. m.
Then as 156 : 1 : : 708 : 4 53 8+ Ans.
For 708×1=708 which ÷156=\$4 53 *cts.* 8 *m.*+72

(51) To find the prime cost.

C. *C.* *qrs.* *lbs.* $ *cts.* $ *cts.* *m.*
1 : 19 2 17 : : 9 31¼ : 183 00 7+
lbs. *lbs.* $ *cts.* $ *cts.* *m.*
Or, as 112 : 2201 : : 9 31¼ : 183 00 7+
For 931¼×2201=2049681¼ which ÷112=$183 00 *cts.* 7 *m.*+ Ans.

To find the sum it sold for.
lbs. *lbs.* $ *cts.* $ *cts.* *m.*
As 112 : 2201 : : 10 65 : 209 29 1+
For 1065×2201=2344065 which ÷112=$209 29 *cts.* 1 *m.* Ans.

To find the gain. It sold for $209 29 *cts.* 1 *m.*—$183 00 *cts.* 7 *m.*=$26 28 *cts.* 4 *m.*

yds. *yd.* $ *cts.* *cts.* *m.*
(52) As 47 : 1 : : 14 75 : 31 3+
For 1475×1=1475 which ÷47=31 *cts.* 3 *m.*+ Ans.

(53) 3 qrs. wide : 1¼ wide : : 3¾ long : 6½ long.
For 3¾=15 *qrs.* and 1¼=5 *qrs.* therefore 15×5=75 which ÷3=25 *qrs.*=the quantity of holland requisite for each suit, and this 25 *qrs.*×354 suits or men=8850 *qrs.* which ÷4=2212½ *yds.* Ans.

(54) First 25 *ft.* : 250 *ft.* : : 33 *ft.* 10 *in.* : 338 *ft.* 4 *in.*
For 33 10×12=406 *in.*×250=101500 which ÷25 =4060 *in.*=338 *ft.* 4 *in.* the length of the shadow of the tower. Then as the shadow is 18 *ft.* 6 *in.* longer than the width of the river, consequently 338 *ft.* 4 *in.*—18 *ft.* 6 *in.*=319 *ft.* 10 *in.* the width of the river. Ans.

(55) First, 24 *hrs.* : 1 *m.* : : 360 *deg.* : 17 *m.* 3 *fur.* 1st Ans.
For 360×69½×1=25020 and 24 *hrs.*×60=1440; therefore 25020÷1440=17 *m.* 3 *fur.*
Again, 24 *hrs.* : 1 *m.* : : 360 *deg.* : 11 *m.* 4 *fur.*= the velocity of the earth in lat. 40 *deg.*
For 360×46=16560÷1440=11 *m.* 4 *fur.*
Then, 17 *m.* 3 *fur.*—11 *m.* 4 *fur.*=5 *m.* 7 *fur.* 2d Ans.

DOUBLE RULE OF THREE.

EXAMPLES.

(2) Thus $\left.\begin{array}{l}3\,m.\ :\ 8\,m.\\ 12\,d.\ :\ 24\,d.\end{array}\right\}::\ 32A.\ :\ 170A.\ 2R.\ 26P.\ 20yds.+$

For 8×24×32=6144 the dividend.

And 3×12=36 the divisor.

Then 6144÷36=170 *A.* 2 *R.* 26 *P.* 20 *yds.*+ Ans.

(3) Thus $\left.\begin{array}{l}10oz.\ :\ 20oz.\\ 18d.\ :\ 27d.\end{array}\right\}::\ 2A.\ :\ 6A.$

For 20×27×2=1080 the dividend.

And 18×10=180 the divisor.

Then 1080÷180=6 *A.* Ans.

(4) Thus $\left.\begin{array}{l}9m.\ :\ 2m.\\ 10d.\ :\ 5d.\end{array}\right\}::\ 36\ lbs.\ :\ 48\ lbs.$

For 24×5×36=4320 the dividend.

And 9×10=90 the divisor.

Then 4320÷90=48 *lbs.* Ans.

(5) Thus $\left.\begin{array}{l}\$100\ :\ \$335\\ 12m.\ :\ 18m.\end{array}\right\}::\ \$6\ :\ \$30\ 15\ cts.$

For 335×18×6=36180 the dividend.

And 100×12=1200 the divisor.

Then 36180÷1200=$30 15 *cts.* Ans.

(6) Thus $\left.\begin{array}{l}20m.\ :\ 46m.\\ 5d.\ :\ 32d.\end{array}\right\}::\ \$56\ 31\tfrac{1}{4}\,cts.\ :\ \$828\ 92\ cts.$

For 46×32×5631¼=8289200 the dividend.

And 20×5=100 the divisor.

Then 8289200÷100=$828 92 *cts.* Ans.

(7) Thus $\left.\begin{array}{l}8m.\ :\ 12m.\\ 30d.\ :\ 90d.\end{array}\right\}::\ 120\ pairs.:\ 540\ pairs.$

For 12×90×120=129600 the dividend.

And 8×30=240 the divisor.

Then 129600÷240=540 *pairs.* Ans.

(8) Thus $\left.\begin{array}{l}12p.\ :\ 38p.\\ 4d.\ :\ 16d.\end{array}\right\}::\ 37lbs.\ :\ 468\ lbs.\ 10\tfrac{2}{3}\ oz.$

For 38×16×37=22496 the dividend.

And 12×4=48 the divisor.

Then 22496÷48=468 *lbs.* 10⅔ *oz.* Ans.

(9) Thus $\left.\begin{array}{lcl} 8\textit{li.} & : & 12\textit{li.} \\ 4\textit{E.} & : & 7\textit{E.} \end{array}\right\} :: 5\textit{ pts.} : 13\textit{ pts.}+$

For 12×7×5=420 the dividend.
And 8×4=32 the divisor.
Then 420÷32=13+ Ans.

(10) Thus $\left.\begin{array}{lcl} 7\frac{1}{2}\textit{yds.} & : & 24\textit{yds. }2\textit{qrs.} \\ 3\textit{qrs.} & : & 7\textit{qrs.} \end{array}\right\} :: \$17\ 37\frac{1}{2}\textit{ cts.} : \$132\ 43\textit{ cts.}+$

For 24*yds.* 2*qrs.*=98*qrs.* And 7½*yds.*=30*qrs.*
Then 98×7×1737½=1191925 the dividend.
And 30×3=90 the divisor.
Then 1191925÷90=$132 43 *cts.*+ Ans.

(11) Thus $\left.\begin{array}{lcl} 20\textit{h.} & : & 62\textit{h.} \\ 22\textit{d.} & : & 36\textit{d.} \end{array}\right\} :: 12\textit{bu.} : 60\textit{bu. }3\textit{pe. }3\textit{qts. }1\textit{pt.}+86$

For 62×36×12=26784 the dividend.
And 20×22=440 the divisor.
Then 26784÷440=60*bu.* 3*pe.* 3*qts.* 1*pt.*+376 Ans.

(12) Thus $\left.\begin{array}{lcl} \$100 & : & \$563 \\ 12\textit{m.} & : & 54\textit{m.} \end{array}\right\} :: \$6 : \$152\ 01\textit{ct.}$

For 563×18×6=182412 the dividend.
And 100×12=1200 the divisor.
Then 182412÷1200=$152 01*ct.* Ans.

(13) Thus $\left.\begin{array}{lcl} 8\textit{h.} & : & 20\textit{h.} \\ 7\textit{m.} & : & 17\textit{m.} \end{array}\right\} :: 6\textit{T.} : 36\textit{T. }8\textit{cwt. }2\textit{qrs. }8\textit{lbs.}$

For 20×17×6=2040 the dividend.
And 8×7=56 the divisor.
Then 2040÷56=36*T.* 8*cwt.* 2*qrs.* 8*lbs.* Ans.

(14) Thus $\left.\begin{array}{lcl} 2\textit{yds.} & : & 50\textit{yds.} \\ 5\textit{qrs.} & : & 3\textit{qrs.} \end{array}\right\} :: 1\textit{lb.} : 15\textit{lbs.}$

For 50×3×1=150 the dividend.
And 2×5=10 the divisor.
Then 150÷10=15*lbs.* Ans.

(15) Thus $\left.\begin{array}{lcl} \$21 & : & \$96 \\ 32\textit{d.} & : & 3\textit{d.} \end{array}\right\} :: 7\textit{re.} : 3\textit{re.}$

For 96×3×7=2016 the dividend.
And 21×32=672 the divisor.
Then 2016÷672=3. Ans.

(16) Thus $\left.\begin{array}{lcl}4m. & : & 12m.\\ \$7\frac{1}{2} & : & \$9\end{array}\right\}::\ \$100 : \$360$

For $12\times9\times100=10800$ the dividend.
And $4\times7\frac{1}{2}=30$ the divisor.
Then $10800\div30=\$360$. Ans.

(17) Inversely thus $\left.\begin{array}{lcl}\left.\begin{array}{l}40ft.\\ 54ft.\end{array}\right\} & : & \left\{\begin{array}{l}20ft.\\ 54ft.\end{array}\right.\\ 72m. & : & 27m.\end{array}\right\}::\ 10d. : 1d.\ 10\frac{1}{2}hrs.$

For $20\times54\times27\times10=291600$ the dividend.
And $40\times54\times72=155520$ the divisor.
Then $291600\div155520=1d.\ 10\frac{1}{2}hrs.$ Ans.

(18) Thus $\left.\begin{array}{lcl}305m. & : & 1056m.\\ 12\frac{1}{2}h. & : & 14h.\end{array}\right\}::\ 30d. : 116d.+2540$

For $1056\times14\times30=443520$ the dividend.
And $305\times12\frac{1}{2}=3812\frac{1}{2}$ the divisor.
Then $443520\div3812\frac{1}{2}=116d.$ Ans.

(19) Thus $\left.\begin{array}{lcl}\$210 & : & \$837\\ 15m. & : & 4m.\end{array}\right\}::\ 24w.\ 3d. : 25w.\ 6d.+$

For $24w.\ 3d.=171d.$ And $837\times4\times171=572508$ the dividend.
And $210\times15=3150$ the divisor.
Then $572508\div3150=181d.=25w.\ 6d.+2358$ Ans.

(20) Thus $\left.\begin{array}{lcl}2\frac{1}{2}yrs. & : & 5yrs.\\ \$15 & : & \$30\end{array}\right\}::\ \$50 : \$200$

For $5\times30\times50=7500$ the dividend.
And $2\frac{1}{2}\times15=37\frac{1}{2}$ the divisor.
Then $7500\div37\frac{1}{2}=\$200$. Ans.

(21) Thus $\left.\begin{array}{lcl}5m. & : & 34m.\\ 4d. & : & 90d.\end{array}\right\}::\ \$20\ 50\ cts. : \$3136\ 50\ cts.$

For $34\times90\times2050=6273000$ the dividend.
And $5\times4=20$ the divisor.
Then $6273000\div20=\$3136\ 50\ cts.$ Ans.

(22) Thus $\left.\begin{array}{lcl}24cwt. & : & 76cwt.\\ 45m. & : & 121m.\end{array}\right\}::\ \$18 : \$153\ 26\ cts.+720$

For $76\times121\times18=165528$ the dividend.
And $24\times45=1080$ the divisor.
Then $165528\div1080=\$153\ 26\ cts.$ Ans.+

23) Thus $\left.\begin{array}{rcr}42A. & : & 392A.\\ 14D. & : & 7D.\end{array}\right\} :: 6\,men : 28\,men.$

For $392\times7\times6=16464$ the dividend.
And $42\times14=588$ the divisor.
Therefore $16464\div588=28\,men.$ Ans.

24) Thus $\left.\begin{array}{rcr}35cwt. & : & 50cwt.\\ 20m. & : & 150m.\end{array}\right\} :: \$9\ 50cts. : \$101\ 78\frac{1}{2}cts.+$

For $50\times150\times950=7125000$ the dividend.
And $35\times20=700$ the divisor.
Then $7125000\div700=\$101\ 78\frac{1}{2}cts.+$ Ans.

25) Thus $\left.\begin{array}{rcr}\$11\ 75cts. & : & \$31\ \ 18\frac{3}{4}cts.\\ 9m. & : & 1yr.\ 6mo.\end{array}\right\} :: \$125 : \$663\ 56\ cts.+$

For $3118\frac{3}{4}=12475qrs.\times18m.\times125=28068750$ the dividend.
And $\$11\ 75cts.=4700qrs.\times9=42300$ the divisor.
Then $28068750\div42300=\$663\ 56\frac{1}{4}cts.+$ Ans.

26) Thus $\left.\begin{array}{rcr}\$100 & : & \$275\\ 12m. & : & 56m.\end{array}\right\} :: \$6 : \$77$

For $275\times56\times6=92400$ the dividend.
And $100\times12=1200$ the divisor.
Then $92400\div1200=\$77.$ Ans.

(27) Thus $\left.\begin{array}{rcr}\$56 & : & \$6\\ 12m. & : & 20m.\end{array}\right\} :: \$560 : \$100$

For $6\times20\times560=67200$ the dividend.
And $56\times12=672$ the divisor.
Then $67200\div672=\$100.$ Ans.

(28) Thus $\left.\begin{array}{rcr}12yds. & : & 75yds.\\ 5qrs. & : & 3qrs.\end{array}\right\} :: 5lb. : 18lbs.\ 12oz.$

For $75\times3\times5=1125$ the dividend.
And $12\times5=60$ the divisor.
Then $1125\div60=18lb.\ 12oz.$ Ans.

PRACTICE.

EXAMPLES.

CASE 1.

(3) |½|½|296 at ¾

|¼|⅓|148

74

Ans. $2 22 *cts.*

(4) |½|½|3268 at ½

Ans. $16 34 *cts.*

(5) |½|½|4260 at ¾

|¼|⅓|2130

1065

Ans. $31 95 *cts.*

(6) |¼|¼|5324 at ¼

Ans. $13 31 *cts.*

m.

(7) |2|⅕|634 at 2 *mills.*

Ans. $1 26 8

m.

(8) |2|⅕|352 at 4 *mills.*

|2|⅕| 70 4

70 4

Ans. $1 40 8

m.

(9) |5|½|3456 at 5 *mills.*

Ans. $17 28

m.

(10) |5|½|498 at 6 *mills.*

|1|⅕|249

49 8

Ans. $2 98 8

(11)

m.		
5	$\frac{1}{2}$	8462 at 8 *mills*
2	$\frac{1}{5}$	4231
1	$\frac{1}{2}$	1692 4
		846 2

Ans. $67 69 6

(12)

m.		
5	$\frac{1}{2}$	1264 at 7 *mills.*
2	$\frac{1}{5}$	632
		252 8

Ans. $8 84 8

(13)

m.		
5	$\frac{1}{2}$	4628 at 9 *mills.*
2	$\frac{1}{5}$	2314
2	$\frac{1}{5}$	925 6
		925 6

Ans. $41 65 2

CASE 2

(2)

cts.		
6¼	$\frac{1}{16}$	3648 at 6¼ *cts.*

Ans. $228

(3)

cts.		
10	$\frac{1}{10}$	742 at 10 *cts.*

Ans. $74 20

(4)

cts.		
20	$\frac{1}{5}$	8264 at 20 *cts.*

Ans. $1652 80

(5)

cts.		
25	$\frac{1}{4}$	386 at 25 *cts.*

Ans. $96 50

(6)

cts.		
50	$\frac{1}{2}$	5876 at 50 *cts.*

Ans. $2938

(7)

cts.		
25	$\frac{1}{4}$	3542 at 45 *cts.*
20	$\frac{1}{5}$	885 50
		708 40

Ans. $1593 90

	cts.		
(8)	50	½	31925 at 80 *cts.*
	25	½	15962 50
	5	⅕	7981 25
			1596 25
		Ans.	$25540 00

	cts.		
(9)	12½	⅛	4264 at 12½ *cts.*
		Ans.	$533

	cts.		
(10)	50	½	18626 at 55 *cts.*
	5	$\frac{1}{10}$	9313
			931 30
		Ans.	$10244 30

	cts.		
(11)	25	¼	1724 at 37½ *cts.*
	12½	½	431
			215 50
		Ans.	$646 50

	cts.		
(12)	10	$\frac{1}{10}$	528 at 16 *cts.*
	5	½	52 80
	1	⅕	26 40
			5 28
		Ans	$84 48

	cts.		
(13)	50	½	13854 at 56¼ *cts.*
	6¼	⅛	6927
			865 87 5
		Ans.	$7792 87 5

	cts.		
(14)	20	⅕	4858 at 29 *cts*
	5	¼	971 60
	4	⅕	242 90
			194 32
		Ans.	$1408 82

	cts.		
(15)	50	½	2267 at 85 *cts.*
	25	½	1133 50
	10	⅕	566 75
			226 70
		Ans.	$1926 95

	cts.		
(16)	20	$\frac{1}{5}$	190 at 20 *cts.*
		Ans.	$38

	cts.		
(17)	12$\frac{1}{2}$	$\frac{1}{8}$	3654 at 18$\frac{3}{4}$ *cts.*
	6$\frac{1}{4}$	$\frac{1}{2}$	456 75
			228 37 5
		Ans.	$685 12 5

	cts.		
(18)	50	$\frac{1}{2}$	17638 at 70 *cts.*
	10	$\frac{1}{5}$	8819
	10	$\frac{1}{5}$	1763 80
			1763 80
		Ans.	$12346 60

CASE 3.

			$ *cts.*
(2)	2	$\frac{1}{2}$	10 25
			10
			102 50
	7	$\frac{1}{8}$	5 12 5
			0 64 0
		Ans.	$108 26 5

			$ *cts.*
(3)	2	$\frac{1}{2}$	4 15
			7
			29 05
	1	$\frac{1}{2}$	2 07 5
	14	$\frac{1}{2}$	1 03 7
	4	$\frac{1}{7}$	0 51 8
	1	$\frac{1}{4}$	0 14 8
			0 3 7
		Ans.	$32 86 5

```
     Cwt. qr. lb.  $ cts.
(4)  129  1  10 at 1 05
                   129
                  -----
                   945
                  210
                 105
                 -----
   |1 | 1/4 |13545
   |7 | 1/4 |    26  2
   |2 | 1/14|     6  5
   |1 | 1/2 |     1  8
   |  |     |     0  9
              ----------
       Ans. $135  80  4
              ----------
```

```
      Cwt.qr.   $ cts.
(5)   16  2 at  5 18
                  16
               -------
      |2| 1/2 |3108
      | |     |518
      | |     |-------
      | |     |82  88
      | |     | 2  59
               -------
        Ans. $85  47
               -------
```

```
     Cwt. qr.   $
(6)  130  1 at 15
              130
             -----
   |1| 1/4 | 450
   | |     |15
   | |     |-----
   | |     |1950
   | |     |   3  75
             --------
     Ans. $1953  75
             --------
```

```
      Cwt. qr. lb.    cts.
(7)   25   1   9 at 175
                     25
                    -----
   |1| 1/4 |  875
   |4| 1/7 |350
   | |     |---------
   |4| 1/7 |43  75
   |1| 1/4 |    43  7
   | |     |     6  2+
   | |     |     6  2+
   | |     |     1  5+
            ----------
  A[illegible] $44  32  8
            ----------
```

```
     qrs. lb.      cts.
(8)    2  14  at  2710
     |  |     |-----
     | 2| 1/2 |1355
     |14| 1/4 | 338. 7
               -------
     Ans. $16  93  7
               -------
```

```
     lb.  oz. dwt. gr.      $ cts.
(9)   6    5   10   5  at  4 '16
                               6
    | 4| 1/3  |-------
    | 1| 1/4  |2496
    |10| 1/2  |  138  6
    | 5| 1/48 |   34  6
    |  |      |   17  3
    |  |      |        3
               ----------
      Ans. $26  86  8
               ----------
```

lb. oz. dwt. gr. *cts.*
(10) 27 10 4 18 at 2635
27

6	1/2	18445
		5270
3	1/2	711 45
1	1/3	13 17 5
4	1/5	6 58 7
12	1/8	2 19 5
6	1/2	43 9
		5 4
		2 7

Ans. $733 92 7

lb. oz. dwt. gr. *cts.*
(11) 9 11 17 22 at 613
9

6	1/2	
4	1/3	5517
1	1/4	306 5
10	1/2	204 3
5	1/2	51 0
2	1/5	25 5
12	1/4	12 7
6	1/2	5 1
2	1/3	1 2
2	1/3	6
		2
		2

Ans. $61 24 3

oz. dwt. gr. *cts.*
(12) 816 13 12 at 12½
816

10	1/2	1632
		816
		408
		102 00
2	1/5	6 2
1	1/2	1 2
12	1/2	6
		3

Ans. $102 08 3

yd. qr. *$ cts.*
(13) 27 3 at 9 65
27

2	1/2	6755
		1930
		260 55
1	1/2	4 82 5
		2 41 2

Ans. $267 78 7

(14) *yd.* *qr.* *cts.*
860 1 at 84
860

| 1 | $\frac{1}{4}$ | 5040
672

722 40
21

Ans. $722 61

(15) *yd.* *qr.* *na.* *cts.*
126 2 2 at 475
126

| 2 | $\frac{1}{2}$ | 2850
950
475

598 50
| 2 | $\frac{1}{4}$ | 2 37 5
59 3

Ans. $601 46 8

(16) *gal.* *qt* *cts*
428 3 at 140
428

| 2 | $\frac{1}{2}$ | 1120
280
560

599 20
| 1 | $\frac{1}{2}$ | 70
35

Ans. $600 25

(17) *gal.* *qt.* *pt.* *cts.*
765 3 1 at 218$\frac{3}{4}$
4

| 2 | $\frac{1}{2}$ | 875
765

4375
5250
6125

6693 75
| 1 | $\frac{1}{2}$ | 4 37
| 1 | $\frac{1}{2}$ | 2 18
1 09

4)6701 39

Ans. $1675 34$\frac{3}{4}$

hhd. gal. *$ cts.*
(18) 5 31½ at 47 12
5

31½ | ½ | 235 60
23 56

Ans. $259 16

bu. pe. *cts.*
(20) 120 2 at 35
120

2 | ½ | 700
35

4200
17 5

Ans. $42 17 5

bu. pe. qt. pt. *cts.*
(22) 1354 1 5 1 at 25
1354

1 | ¼ | 100
125
75
25

338 50
4 | ½ | 6 2½
1 | ¼ | 3 1¼
1 | ½ | 7¾
3¾

Ans. $338 60 5¼

hhd. gal. qt. *$ cts.*
(19) 17 15 3 at 64 75
17

9 | ⅐ | 453 25
647 5

1100 75
3 | ⅓ | 9 25
3 | ⅓ | 3 08 3
3 | ¼ | 3 08 3
77 1

Ans. $1116 93 7

bu. pe. qt. *$ cts.*
(21) 780 3 2 at 1 17
780

2 | ½ | 9360
819

912 60
1 | ½ | 58 5
2 | ¼ | 29 2
7 3

Ans. $913 55 0

A. R. P. *$ cts.*
(23) 35 2 18 at 54 35
35

2 | ½ | 27175
16305

1902 25
16 | ⅕ | 27 17 5
2 | ⅛ | 5 43 5
67 9

Ans. $1935 53 9

A.R.P. $ *cts.*
(24) 146 3 10 at 35 10

		146
2	$\frac{1}{2}$	21060
		14040
		3510
		5124 60
1	$\frac{1}{2}$	17 55
10	$\frac{1}{4}$	8 77 5
		2 19 3+

Ans. $5153 11 8+

A. R.P. $ *cts.*
(25) 750 1 4 at 12 25

		750
1	$\frac{1}{4}$	61250
		8575
		9187 50
4	$\frac{1}{10}$	3 06 $2\frac{1}{2}$
		0 30 $6\frac{1}{4}$

Ans. $9190 86 $8\frac{3}{4}$

APPLICATION.

Cwt. qr. lb. $ *cts.*
(1) 84 2 14 at 10 50

		84
2	$\frac{1}{2}$	4200
		8400
		882 00
14	$\frac{1}{4}$	5 25
		1 31 2+

Ans. $888 56 2+

Cwt.qr.lb. *cts.*
(2) 17 1 7 at $1212\frac{1}{2}$

		2
1	$\frac{1}{4}$	2425 halves.
		17
		16975
		2425
		412 25
7	$\frac{1}{4}$	6 06 $1\frac{1}{2}$
		1 51 $5\frac{1}{2}$

2)419 83 8 mills.

Ans. $209 91.9 mills.

T. cwt. qr. \$ *cts.*
(3) 15 10 3 at 80 15
15

10	$\frac{1}{2}$	40075		
		8015		
		1202	25	
2	$\frac{1}{20}$	40	07	5
1	$\frac{1}{2}$	2	00	$3\frac{3}{4}$
		1	00	$1\frac{3}{4}$

Ans. \$1245 33 $0\frac{1}{2}$

yd. qr. pie. yd.
(4) 35 2×170=6035 at $\frac{1}{4}$
6035

4)6035 *qrs.*

Ans. \$15 08

A. R. P. \$ *cts.*
(5) 175 3 12 at 52 15
175

2	$\frac{1}{2}$	26075		
		36505		
		5215		
		9126	25	
1	$\frac{1}{2}$	26	07	5
10	$\frac{1}{4}$	13	03	7
2	$\frac{1}{5}$	3	25	9
		0	65	1

Ans. \$9169 27 2

(6) 1365 at $\frac{1}{2}$*ct.*=\$6 $82\frac{1}{2}$*cts.* Ans.

(7) 784 at 84 *cts.*
784

336
672
588

Ans. \$658 56

STERLING MONEY.

CASE 1.

(4) | $\frac{1}{4}$ | $\frac{1}{4}$ | 475 at $\frac{1}{4}$

12)118$\frac{3}{4}$

Ans. 9*s.* 10$\frac{3}{4}$*d.*

(5) | $\frac{1}{2}$ | $\frac{1}{2}$ | 299 at $\frac{1}{2}$

12)149$\frac{1}{2}$

Ans. 12*s.* 5$\frac{1}{2}$*d.*

(6) | $\frac{1}{2}$ | $\frac{1}{2}$ | 978 at $\frac{3}{4}$

| $\frac{1}{4}$ | $\frac{1}{2}$ | 489

244$\frac{1}{2}$

12)733$\frac{1}{2}$

2|0)6|1 1

Ans. £3 1*s.* 1$\frac{1}{2}$*d.*

CASE 2.

(2) | 2 | $\frac{1}{6}$ | 978 at 2*d.*

2|0)16|3

Ans. £8 3*s.*

(3) | 4 | $\frac{1}{3}$ | 499 at 5*d.*

| 1 | $\frac{1}{4}$ | 166 4

41 7

2|0)20|7 11

Ans. £10 7*s.* 11*d.*

(4) | 6 | $\frac{1}{2}$ | 792 at 6*d.*

2|0)39|6

Ans. £19 16*s.*

(5) | 6 | $\frac{1}{2}$ | 888 at 9*d.*

| 3 | $\frac{1}{2}$ | 444

222

2|0)66|6

Ans. £33 6*s.*

(6)

$$\begin{array}{c|c|l} 6 & \frac{1}{2} & 921 \text{ at } 11d. \\ \hline 3 & \frac{1}{2} & 460\ \ 6 \\ 2 & \frac{1}{3} & 230\ \ 3 \\ & & 153\ \ 6 \\ \hline \end{array}$$

$$2|0)84|4\ \ 3$$

Ans. £42 4*s*. 3*d*.

CASE 3.

(2)

$$\begin{array}{c|c|l} 3 & \frac{1}{4} & 487 \text{ at } 15d. \\ & & 121\ \ 9 \\ \hline \end{array}$$

$$2|0)60|8—9$$

Ans. £30 8*s*. 9*d*.

(3)

$$\begin{array}{c|c|l} 6 & \frac{1}{2} & 979 \text{ at } 22\frac{1}{4} \\ 3 & \frac{1}{2} & 489\ \ 6 \\ 1 & \frac{1}{3} & 244\ \ 9 \\ \frac{1}{4} & \frac{1}{4} & \ \ 81\ \ 7 \\ & & \ \ 20\ \ 4\frac{3}{4} \\ \hline \end{array}$$

$$2|0)181|5\ \ 2\frac{3}{4}$$

Ans. £90 15*s*. 2¾*d*.

(4)

$$\begin{array}{c|c|l} 6 & \frac{1}{2} & 532 \text{ at } 23\frac{3}{4}d. \\ 4 & \frac{1}{3} & 266 \\ 1 & \frac{1}{4} & 177\ \ 4 \\ \frac{1}{2} & \frac{1}{2} & \ \ 44\ \ 4 \\ \frac{1}{4} & \frac{1}{2} & \ \ 22\ \ 2\ \ \frac{1}{2} \\ & & \ \ 11\ \ 1\ \ \frac{1}{4} \\ \hline \end{array}$$

$$2|0)105|2\ \ 11\frac{3}{4}$$

Ans. £52 12*s*. 11¾*d*.

CASE 4.

(2)

$$\begin{array}{c|c|l} 5 & \frac{1}{4} & 489 \text{ at } 5s. \\ & & \overline{\quad\quad} \end{array}$$

Ans. £122 5*s*.

(3)

10	½	937 at 11*s.*		
1	1/10	468	10	
		46	17	

Ans. £515 7*s.*

(4)

10	½	1286 at 15*s.*		
5	½	643		
		321	10	

Ans. £964 10*s.*

(5)

10	½	2798 at 19*s.*		
5	½	1399		
4	⅕	699	10	
		559	12	

Ans. £2658 2*s.*

CASE 5.

(2

			£	*s.*	*d.*
10	½	569 at	4	13	7½
		4			
		2276			
2	⅕	284	10		
1	½	56	18		
6	½	28	9		
1	⅙	14	4	6	
½	½	2	7	5	
		1	3	8½	

Ans. £2663 12 7½

(3)

			£	*s.*	*d.*
10	½	1967 at	5	16	9¾
		5			
		9835			
5	½	983	10		
1	⅕	491	15		
6	½	98	7		
3	½	49	3	6	
¾	¼	24	11	9	
		6	2	11¼	

Ans. £11488 10 2¼

(4) 2975 at £7 19*s.* 11¾*d.*

10	½	2975		
		7		
		20825		
5	½	1487	10	
4	⅕	743	15	
8	⅙	595		
2	¼	99	3	4
1	½	24	15	10
½	½	12	7	11
¼	½	6	3	11½
		3	1	11¾
Ans.		£23796	18	0¼

CASE 6.

(2) *C.* 9 *qr.* 2 *lb.* 17 at £4 7*s.* 6*d.*

		£	*s.*	*d.*
				9
2	½	39	7	6
14	¼	2	3	9
2	⅐	0	10	11¼
1	½		1	6¾
				9¼
Ans.		£42	4	6¼

(3) *C.* 11 *qr.* 1 *lb.* 16 at £5 6*s.* 7½*d.*

		£	*s.*	*d.*
				11
1	¼	58	12	10½
14	½	1	6	7¾
2	⅐		13	3¾
			1	10¾
Ans.		£60	14	8¾+

(4) *C.* 7 *qr.* 3 *lb.* 22 at £1 18*s.* 4¾*d.*

		£	*s.*	*d.*
				7
2	½	13	8	9¼
1	½	0	19	2¼
14	½		9	7
7	½		4	9½
1	⅐		2	4¾
				4
Ans.		£15	5	0¾

(5) *C.* 27 *qr.* 1 *lb.* 19 at £2 17*s.* 8¼*d.*

3×9=27

		£	*s.*	*d.*
1	¼	8	13	0¾
				9
		77	17	6¾
14	½		14	5+
4	⅐		7	2½
1	¼		2	0½
				6+
Ans.		£79	1	8¾

TARE AND TRET.

CASE 1.

	Cwt.	qr.	lb.
(2)	7	3	20
			8
gross	63	1	20
	—5	1	19
Ans.	58	0	1

	Cwt.	qr.	lb.
(3)	6	2	5
	—	1	11
Ans.	6	0	22

	Cwt.	qr.	lb.
(4)	369	2	21
	—10	1	12
Ans.	359	1	9

	Cwt.	qr.	lb.	
(5)	5	1	19	
			8	
	43	1	12	whole gross.
	—2	0	23	tare.
Ans.	41	0	17	neat.

		C.	qr.	lb.		lb.
(6)	No. 1.	3	2	19	tare	34
	No. 2.	6	0	13	tare	57
	No. 3.	4	3	5	tare	46
						C. qr. lb.
		14	2	9	w. t.	137=1 0 25
		—1	0	25		
	Ans.	13	1	12		

CASE 2.

	C.	qr.	lb.	
(2)	4	2	24	
			7	
	33	0	0	gross.
	4	2	14	tare.
Ans.	28	1	14	neat.

qr.	lbs.
2	18
	7

4cwt. 2qrs. 14*lbs.* whole tare.

(3)

	C.	qr.	lb.		$	cts.
	21	2	21			
	3	0	18			
Neat	18	2	3	at	5	50
						18

qrs.			
2	$\frac{1}{2}$	4400	
		550	
		9900	
lbs.			
2	$\frac{1}{28}$	275	
1	$\frac{1}{2}$	9	8+
		4	9.

Ans. $101 89 7

(4)

	C.	qr.	lb.			
	2	1	25			
			9			
	22	1	1	gross.		
	2	1	18	tare.	$	cts.
Neat	19	3	11	at	5	10
						19

lb		C.	qr.	lb.
30				
9				
270	=	2	1	18

qrs.				
2	$\frac{1}{2}$	45	90	
		51	0	
		96	90	
1	$\frac{1}{2}$	2	55	
7	$\frac{1}{4}$	1	27	5
4	$\frac{1}{7}$		31	8+
			18	2+

Ans. $101 22 5 value.

CASE 3.

	lbs.		C.	qr.	lb.	
(2)			7	3	14	
					4	
	16	$\frac{1}{7}$	31	2	0	gross.
	4	$\frac{1}{4}$	4	2	0	
			1	0	14	
			5	2	14	tare.
Ans.			25	3	14	neat.

	lbs.		C.	qr.	lb.		$	cts.	
(3)			5	1	13				
					10				
	16	$\frac{1}{7}$	53	2	18	gross.			
			7	2	18+	tare.			
Neat			46	0	0	at	8	75	
								46	
							5250		
							3500		
						Ans.	$402	50	value.

(4) *4C. 1qr. 24lb.*

lbs.				6	
16	$\frac{1}{7}$	26	3	4	gross.
2	$\frac{1}{8}$	3	3	8+	
		0	1	25+	
Tare		4	1	5	
Neat		22	1	27	=2519 lbs. at 7½ cts.

7½

17633

1259 5

Ans. $188 92 5 value.

CASE 4.

(2) *2C. 1qr. 10lb.*

lbs.				12	
16	$\frac{1}{7}$	28	0	8	gross.
2	$\frac{1}{8}$	4	0	1	
		0	2	0	
		4	2	1	tare.
lbs. 4	$\frac{1}{26}$	23	2	7	suttle.
		0	3	17	tret.
Neat		22	2	18	at $ 19 60 cts.

		$	cts.
			22
1	$\frac{1}{4}$	39	20
		392	0
lbs.		431	20
14	$\frac{1}{2}$	9	80
		2	45
2	$\frac{1}{7}$		35
2	$\frac{1}{7}$		35

Ans. $444 15 value.

	C.	qr.	lb.				qr.	lb.	
(3)	4	1	11				1	5	
			6					6	
	26	0	10	gross.		cwt. 1	3	2	tare.
	1	3	2	tare.					
$\frac{1}{28}$)	24	1	8	suttle.					
	—0	3	20	tret.					
					$ cts.				
Neat	23	1	16	at	6 75				
					23				

		$	cts.
qrs.			
1	$\frac{1}{4}$	20	25
		135	0
lbs.		155	25
14	$\frac{1}{2}$	1	$68\frac{3}{4}$
2	$\frac{1}{7}$		$84\frac{1}{4}$
			12

Ans. $157 90 value.

APPLICATION.

	C.	qr.	lb.		lbs.		cts.
(1)	17	3	22	gross.			
		3	14	tare.			
Neat	17	0	8	=	1912	at	$23\frac{1}{4}$
					$23\frac{1}{4}$		
					5736		
					3824		
					478		

Ans. $444 54

(2) 5*C.* 2*qr.* 19*lb.* 2*qr.* 25*lb.*

3×5=15 3

17 0 1 2 0. 19

5 5

85 0 5 gross. *C.*10 3 11 tare.

10. 3 11 tare.

Neat 74 0 22 at $6 75*cts.*

74

16 | 1/7 | 27 00

472 5

499 50

4 | 1/4 | 96

2 | 1/2 | 24

12

Ans. $500 82 value.

(3)

	C.	*qr.*	*lb.*
No. 1.	6	3	18
No. 2.	7	0	10
No. 3.	5	3	26
No. 4.	8	0	3

lbs.

8 | 1/14 | 28 0 1 gross.

4 | 1/2 | 2 0 0

1 0 0

3 0 0 tare.

Neat 25 0 1 at $3 75*cts.*

25

18 75

75 0

lb.

1 | 1/112 | 93 75

3 3.

Ans. $93 78 3 value.

(4) 1*C.* 1*qr.* 23*lb.* 18*lb.*
4×6=24 24

5 3 8 72
6 36 *C.qr.lb.*

34 3 20 gross. 432=3 3 12 tare.
3 3 12 tare.

Neat 31 0 8 at $5 17½*cts.*
2

1035 halves.
31

1035
3105

32085
73 9

2)32168 9

Ans. $160 79 4 value.

(5) 1*C.* 1*qr.* 13*lb.* 22*lb.*
3×5=15 15

4 0 11 110
5 22 *C.qr.lb.*

20 1 27 gross. 320=2 3 22 tare.
2 3 22 tare.

Neat 17 2 5 at $9 64*cts.*
17

| 2 | ½ | 67 48
96 4

lb. | | 163 38
4 | $\frac{1}{14}$ | 4 82
1 | ¼ | 34 4
8 6

Ans. $169 13 0

			C.	*qr.*	*lb.*			
(6)			6	2	14			
					10			
lbs.								
16	$\frac{1}{7}$		66	1	0	gross		
2	$\frac{1}{8}$		9	1	24			
			1	0	20			
			10	2	16	tare.		
lb. 4	$\frac{1}{26}$		55	2	12	suttle.		
			2	0	15	tret.		
							lbs.	*cts.*
		Neat	53	1	25	=	5989 at	11½
							11½	
							65879	
							2994 5	
						Ans.	$688 73 5 value.	

* * *

INTEREST.

EXAMPLES IN CASE 1.

	$			$ *cts.*
(2)	225		(3)	384 50
	7			5
Ans.	$15 75		Ans.	$19 22 5 *m.*

(4) £ s.
580 10
6
£34 83 0 Ans. £ s. d. 34 16 7
20
s.16 60
12
d.7 20

(5) $ cts.
1654 81
5
$82 74 05 Ans. $ cts. 82 74

(6) $
| $\frac{1}{2}$ | $\frac{1}{2}$ | 1500
Ans. $7 50

(7) £
350
$5\frac{1}{4}$
1750
87 10
£18 37 10
20
s.7 50
12
d.6 00

Ans. £ s. d. 18 7 6

(8) $
| $\frac{1}{4}$ | 524
$5\frac{1}{4}$
2620
131
Ans. $27 51

(9) $
| $\frac{1}{2}$ | 842
$5\frac{1}{2}$
4210
421
Ans. $46 31

CASE 2.

(2) $
540
5

27|00
2

Ans. $54|00

(3) £ s. d.
124 5 6
4

£4|97 2 0
20

s.19|42
12

d.5|04

£ s. d.
4 19 5 Int. for 1 year.
3

£14 18 3 Ans

(4) $
482
6

$28|92 interest for 1 year
7

Ans. $202|44

CASE 3.

(2) $
325
4

mo. 2 | $\frac{1}{6}$ | 13|00 Int. for 1 *yr.*
4

52 Int. for 4 *yrs.*
2|16|6 Int. for 2 *mo.*

Ans. $54 16 6

(3) $
840
4

mo. 3 | ¼ | 33|60 Int. for 1 *yr.*
5

168|00 Int. for 5 *yr.*
8|40 Int. for 3 *mo.*

Ans. $176 40

(4) $
840
7

mo. 4 | ⅓ | 58|80 Int. for 1 *yr.*
5

294|00 Int. for 5 *yrs.*
19|60 Int. for 4 *mo.*

Ans. $313 60

(6) $
1200
5

Ans. $60 00 Int. for 1 *yr.* Then say, as 1*yr.* : 15*w.* :: $60 : $17 30*cts.* Ans.

(7) $
½ | ½ | 240
4¾

960
¼ | ½ | 120
60

Ans. $11 40 Int. for 1 *yr.* Then say, as 1*yr.* : 61*d.* :: $11 40 : $1 90*cts.* Ans.

(8)
£
1000
7

£70 00 Int. for 1 *yr*. Then as 1*yr*. : 14*mo*. : : £70 : £81 13*s*. 4*d* Ans.

(9)
$
450
5½

2250
225

$24 75 Int. for 1 *yr*. Then as 1*yr*. : 6*mo*. 20*d*. : : $24 75*cts*. : $13 75*cts*.+ Ans.

(10)
$ *cts*.
375 25
6

$22 51 50 Int. for 1 *yr*. Then as 1*yr*. : 3*yrs*. 2*mo*. 3*w*. 5*d*. : : $22 51*cts*. 5*m*. : $72 85. Ans.

CASE 4.

(2)
$
854
30

6)25620

Ans. $4 27 0

(3)
$
1100
48

8800
4400

6)52800

Ans. $8 80 0

(4) $
3459
75
17295
24213
6)259425
Ans. $43 23 7

(5) $
1500
60
6)90000
|1|$\frac{1}{6}$|15000*m.* at 6 per cent.
—2500
Ans. $12 50 0

CASE 5.

(2) 6 yrs.
4 dolls.
24 Int. of £100 for 6 yrs.
+100
£124 amount of £100 for 6 yrs.

Then as £124 : £1240 : : £100 : 1000. Ans.

(3) 5 yrs.
6 dolls.
30 Int. of $100 for 5 yrs.
100
$130 amount of $100 for 5 yrs.

Then as $130 : $2470 : : $100 : $1900. Ans.

CASE 6.

(2) $
1476 amt.
1200 prin.
$276 Int.

And $1200 : $100 : : $276 : $23 int. of $100 for the same time.

Then as 5*yrs.* 9*mo.* : $23 : : 1*yr.* : $4 per cent. Ans.

$ *cts.*

(3) 927 82½ amt.

834 00 prin.

$93 82½ int.

As $834 : $93 82½*cts.* : : $100 : $11 25*cts.*

And then, as 2*yrs.* 6*mo.* : $11 25*cts.* : : 1*yr.* : $4½ per cent. Ans.

CASE 7.

£ £

(2) 1600 2048

4 1600

£64 00 : 1*yr.* : : 448 : 7*yrs.* Ans.

$

(3) 1000

4½

40 00

5 00

$45 00 : 1*yr.* : : $281 25*cts.* : 6*yrs.* 3*mo.* Ans.

COMPOUND INTEREST.

$

(2) 760 prin.

6 rate per cent.

45 60 int. 1st year.

805 60 amt. of 1st yr. and prin. for the 2d yr.

.48 33 6 int. of 2d yr.

853 93 6 amt. of 2d yr. and prin. for the 3d yr.

51 23 6 int. of 3d yr.

905 17 2 amt. of 3d yr.

760 00 0 1st prin.

Ans. $145 17 2 compound int.

(3)

£	s.	d.
242	10	6
		6
£14|55	3	0
20		
11|03		

£	s.	d.	
242	10	6	
14	11	0	int. 1st yr.
257	1	6	amt.
15	8	5¾	int. 2d yr.
272	9	11¾	amt.
16	7	0	int. 3d yr.
288	16	11¾	amt.
17	6	7¼	int. 4th yr.
306	3	7	amt.
—242	10	6	1st. prin.
Ans. 63	13	1+	com. int.

(4)

$
1300
5

65|00 int. 1st yr
1300

1365 amt.
5

68|25 int. for 2d yr
1365

1433|25 amt.
5

71|66|2 int. for 3d yr.
1433|25

Ans. $1504 91 2*m.* amt.

(5)
$
3127
4½

12508
1563 5

$140 71 5

$
3127
140 71 5 int. of the 1st yr

3267 71 5 amt.
147 4 7 int. 2d yr.

3414 76 2 amt.
153 66 4 int. 3d yr.

3568 42 6 amt.
160 57 9 int. 4th yr.

Ans. $3729 00 5 amt.

PROMISCUOUS EXAMPLES.

(1)
$ *cts.*
620 25
5½

3101 25
310 12

34 11 37 int. for 1 yr.
5

Ans. $170 56 8*m.*

(2)
£
420
7

£29 40
20

*s.*8 00 Ans. £29 8*s*

(3)
$
1450
60

6)87000

14500 mills=$14 50*cts.* Ans.

(4)

£ s.
626 5
5¼
3131 5
156 11 3
£32|87 16 3
20
*s.*17|56
12
*d.*6|75
4
*qrs.*3|00

	£	s.	d.	
	626	5	0	
	32	17	6¾	int. of the 1st yr.
	659	2	6¾	amt.
	34	12	1	int. of 2d yr.
	693	14	7¾	amt.
	36	8	5	int. of 3d yr.
	730	3	0¾	amt.
	—626	5	0	prin.
Ans.	£103	18	0¾+	compound int.

(5)

£
1659
4

Int. for 1 yr.
£66|36
20
*s.*7|20
12
*d.*2|40
4
*qr.*1|60

Then as 365 *days* : 21 *days* : : £66 7*s.* 2¼*d.* : £3 16*s.* 4¼*d.*+ Ans.

(6)
$
500
8

$40 00 int. for 1 yr.

Then as $40 : $500 :: 1*y.* : 12*yrs.* 6*mo.* Ans.

(7) Thus, 6*yrs.* and 6*mo.* at 2 per cent.=$13 interest on $100.
Then $13+$100=$113=amount of $100.
And as $113 : $250 :: $100 : $221 23*cts.* 9*m.* Ans.

(8)
£
450 amount.
300 principal.

£150 interest.

Then as £300 : £100 :: £150 : £50 which divided by the 5 years=10 per cent. Ans.

* * *

INSURANCE, COMMISSION AND BROKAGE.

EXAMPLES.

(2)
£
1320
5

Ans. £66|00

(3)
$
3450
$4\frac{1}{2}$

13800
1725

Ans. $155|25*cts.*

(4)
$
$\frac{1}{2}$ | $\frac{1}{2}$ | 1680
$2\frac{3}{4}$

3360
$\frac{1}{4}$ | $\frac{1}{2}$ | 840
420

$46|20 commission.

$1680—$46 20*cts.*=$1633|80*cts.* Ans.

£
(5) 760
$6\frac{1}{2}$
4560
380
£49|40 Ans £49 8s
20
s.8|00

$
(6) $\frac{1}{2}$ | $\frac{1}{2}$ | 5630
$7\frac{3}{4}$
39410
$\frac{1}{4}$ | $\frac{1}{2}$ | 2815
1407 5
Ans. $436|32|5*m.*

$
(7) $\frac{1}{2}$ | $\frac{1}{2}$ | 17654
$18\frac{3}{4}$
141232
17654
$\frac{1}{4}$ | $\frac{1}{2}$ | 8827
4413 $\frac{1}{2}$
Ans. $3310|12 $\frac{1}{2}$

£
(8) 2150
2
Ans. £43|00

$ *cts.*
(9) $\frac{1}{4}$ | $\frac{1}{4}$ | 984 50
$1\frac{1}{4}$
984 50
246 12 $\frac{1}{2}$
Ans. $12|30|62 $\frac{1}{2}$

$ *cts.*
(10) $\frac{1}{2}$ | $\frac{1}{2}$ | 1650 75
$1\frac{1}{2}$
1650 75
825 37 $\frac{1}{2}$
Ans. $24|76|12 $\frac{1}{2}$

DISCOUNT.

EXAMPLES.

(2) Thus, *2mo.* at 6 per cent. per an.=$1½ int. of $100

+100

101½ amt. of do.

Then as $101½ : $850 :: $100 : $837 43*cts.* 8*m.*+ Ans.

(3) Thus, *9mo.* at 6 per cent. per an.=$4½ int. of $100

100

104½ amt. of 100

Then as $104½ : $645 :: $100 : $617 22*cts.* 4*m.* present worth

645 00 0

Ans. $27 77 6

Yrs

(4) 4

5

20 int. of $100 for 4 yrs.

100

$120 amt. of do.

Then as $120 : $775 50*cts.* :: $100 : $646 25*cts.* Ans.

(5) 8*mo.* at 6 per cent. per an.=$4 int. of $100

100

$104 amt. of do.

Then $104 : $580 :: $100 : $557 69*cts.*+ Ans.

Yrs.
(6) 3
4½

12
1½

13½ int. of 100
100

\$113½ amt. of do.

Then as \$113½ : \$954 :: \$100 : \$840 52*cts.* 8*m.* Ans.

(7) Thus, 15 *mo.* = 1¼ *yr.* at 7 per cent. per annum=\$8¾ the discount of 100.
100

\$108¾ amt.

Then \$108¾ : \$205 :: \$100 : \$188 50*cts.* 5*m.* present worth.
205 00

Ans. \$16 49 5

mo.		£
6	½	5
3	½	2½ 1¼

(8)
3¾ discount of 100
100

\$103¾ amt.

Then as \$103¾ : \$775 :: \$100 : \$746 98*cts.* 7*m.* Ans.

mo. £
(9) 6 | $\frac{1}{2}$ | 6
3 | $\frac{1}{2}$ | 3
1 | $\frac{1}{3}$ | $1\frac{1}{2}$
$\frac{1}{2}$
5 dis. of 100 for 10*mo.*
100
$105 amt.

mo. £
Again | 3 | $\frac{1}{4}$ | 6
1 qr.
6
$1\frac{1}{2}$
$7\frac{1}{2}$ dis. of 100 for 15 *mo.*
100
$107\frac{1}{2}$

$
1005
—475
Rem. 530

Then as 105 : 475 : : 100 : 452 38. Ans. to first part.
Again $107\frac{1}{2}$: 530 : : 100 : 493 02 4

Ans. $945 40 4*m.*

$
(10) 2260
6
135 60 int. for 1 yr.
5
$678 00 int. for 5 yrs.

$
Again 6
5
30 dis. of 100
100
$130 amt.

Then $130 : $2260 : : $100 : $1738 46*cts.* 2*m.* pres. wr.
2260 00 0
521 53 8 discount.
678 00 0 interest.

Ans. $156 46 2

(12) £782
4
£31|28
20
*s.*5|60
12
*d.*7|20
Ans. £31 5*s.* 7*d.*

(13) $476
3
Ans. $14|28cts.

(14) $1385
6
83 10 dis.
1385 00
Ans. $1301 90cts.

(15) $650
4½
2600
325
29|25 discount.
650|00
Ans. $620|75

* * *

EQUATION.

EXAMPLES.

(2) $250×6=1500
250×8=2000
500 3500÷500=7*mo.* Ans.

£
(3) 100×2=200
100×4=400
100×6=600
300 1200÷300=4*mo.* Ans.

$
(4) 100×3= 300
200×5=1000
250×8=2000
550 3300÷550=6*mo.* Ans.

BARTER.

EXAMPLES.

(1) Thus *2cwt. 2qrs.* 13*lbs.*=293*lbs.*×9*cts.*=2637*cts.*
Then as 25*cts.* : 2637*cts.* : : 1*lb.* . 105*lbs.* 7$\frac{17}{28}$*oz.* Ans.

(2) Thus 2500*lbs.*×4$\frac{1}{2}$*cts.*=$112 50*cts.*
Then as $1 30*cts.* : $112 50*cts.* : : 1*lb.* : 86*lbs.* 8*oz.*+ Ans.

(3) Thus 108*lbs.*×$1 25*cts.*=$135 00*cts.*
Then as 8$\frac{3}{4}$*cts.* : $135 00*cts.* : : 1*lb.* : 1542*lb.* 13*oz.*+ Ans.

(4) First, as 1*cwt.* : $3 75*cts.* : : 14*cwt.* 3*qrs.* 26*lbs.* : $56 18*cts.* 3*m.* the value of the rice.
Then as $1 87$\frac{1}{2}$*cts.* : $56 18*cts.* 3*m.* : : 1*lb.* : 29*lbs.* 15*oz.*+ Ans.

(5) Thus *2cwt.* 3*qrs.* 17*lbs.*=325*lbs.*×12$\frac{1}{2}$*cts.*=$40 62$\frac{1}{2}$*cts.*
Then as 37*cts.* : $40 62$\frac{1}{2}$*cts.* : : 1*yd.* : 109*yds.* 3*qrs.* Ans.

(6) Thus 357*bu.*×93*cts.*=$332 01*ct.*
Then 45*cts.* : $332 01*ct.* : : 1*bu.* : 737*bu.* 3*pe.*+ Ans.

(7) Thus 15*cwt.* 0*qr.* 27*lbs.* = 1707*lbs.* × 20*cts.* = \$341 40*cts.*
Then \$9 50*cts.* : \$341 40*cts.* :: 1*cwt.* : 35*cwt.* 3*qrs.* 20*lbs.*+ Ans.

(8) Thus 95*yds.* × 5*pie.*=475*yds.* × 23*cts.*=\$109 25*cts.*
And 32 *sheep* × 250= —80 00

\$29 25 rem.

Then as \$1 50*cts.* : \$29 25*cts.* :: 1*cwt.* : 19*cwt.* 2*qrs.* Ans.

(9) Thus 1286*yds.* at 43*cts.* per *yd.* = \$552 98*cts.*
And 2*cwt.* 1*qr.* 13*lbs.*=265*lbs.* × 14*cts.*=37 10—

Ans. \$515 88

(10) Thus 570*lbs.* × 7*cts.*=\$39 90*cts.*
Then as 11½*cts.* : \$39 90*cts.* :: 1*lb.* : 346*lbs.* 15*oz.*+ Ans.

(11) Thus 112*cwt.* × \$5 04*cts.*=\$564 60*cts.*
Then as 1208*yds.* : \$564 60*cts.* :: 1*yd.* : 46*cts.* 7*m.*+ Ans.

(12) Thus 750*lbs.* × \$1 08*cts.*=\$810 00*cts.*
Then 8*cts.* : \$810 00*cts.* :: 1*lb.* : 10125*lbs.*=90*cwt.* 1*qr.* 17*lbs.* Ans.

(13) Thus 2*hhds.*=126*gals.* × 75*cts.*=\$94 50*cts.*
Then 56*yds.* : \$94 50*cts.* :: 1*yd.* : \$1 68¾*cts.* Ans.

(14) Thus 2108*lbs.* × 10*cts.*=\$210 80*cts.*
And 31*doz.* × 11½*cts.* = +3 56½

\$214 36½ amt. of the whole.
—135 25

\$79 11½ rem.

Then as \$1 58*cts.* : \$79 11½*cts.* :: 1*bu.* : 50*bar.*+ Ans.

5) Thus 17*cwt.*×4×28=1904*lbs.*×13½*cts.*=$257 04*cts.*
value of A.'s goods.
And 1200*lbs.* at the rate of $14 per cwt.=150 00
balance of B.'s goods.
Ans. A. is to receive $107 04

16) Thus 25*cts.*
—20
5 gain on 20*cts.*

Then as 5*cts.* : 20*cts.* : : 5*cts.* : 20*cts.* Ans.

17) Thus 50*cts.* : 56*cts.* : : 31¼*cts.* : 35*cts.* Ans.

18) Thus 105 *tons* at $10 03 per ton=$1053 15*cts.*
value of the iron.
pays cash 650 00
250*lbs.* at 20*cts.* per *lb.*= 50 00
10 loads×15*bu.*×45*cts.*= 67 50
And 85*gals.* at the rate of $75 per *hhd.*= 101 19
—868 69
1053 15
Rem. unpaid $184 46

Then 30*cts.* : $184 46*cts.* : : 1*lb.* : 615*lbs.* nearly. Ans.

* * *

LOSS AND GAIN.

EXAMPLES.

(2) Thus 10*cts.*
—8
2

Then 1*lb.* : 1763*lbs.* : : 2*cts.* : $35 26*cts.* Ans.

(3) Thus \$5 25*cts.*
—5 00
25 gained per barrel.

Then 1*bar.* : 363*bar.* :: 25*cts.* : \$90 75*cts.* Ans.

(4) Thus \$3 90*cts.*
—3 75
15 gained per yard.

Then 1*yd.* : 150*yds.* :: 15*cts.* : \$22 50*cts.* Ans.

(5) First, 1*cwt.* : \$7 50*cts.* :: 18*cwt.* 2*qrs.* : \$138 75*cts.* the cost.
Then 1*cwt.* : \$7 75*cts.* :: 18*cwt.* 2*qrs.* : \$143 37½*cts.* sold for.
Ans. gained \$4 62½

(6) First, 210 *reams* × \$2 62½ = \$551 25*cts.* the cost.
And 210 *reams* × \$2 87½ = \$603 75*cts.* sold for.
Ans. \$52 50 gained.

(7) Thus, sold for \$20 75*cts.*
cost 18 12½
gained \$2 62½ Ans.

(8) First, 50*cts.*
—45
5

Then 1*bu.* : 150*bu.* :: 5*cts.* : \$7 50*cts.* 1st Ans.
Again, 50*cts.* : 5*cts.* :: \$100 : \$10. 2d Ans.

9) First, 760*lbs.*×90*cts.*=$684 00 sold for.
810 00 cost.

Lost 126 00 1st Ans.

Then $810 : $126 : : $100 : $$15\frac{5}{9}$. Ans.

(10) First, $37\frac{1}{2}$*cts.*
32

$5\frac{1}{2}$

Then $37\frac{1}{2}$*cts.* : $5\frac{1}{2}$*cts.* : : $100 : $$14\frac{2}{3}$ per cent. Ans.

11) Thus 1*s.* : 2*d.* : : £100 : £$16\frac{2}{3}$ per cent. Ans.

12) Thus $13 75*cts.* First cost of each piece.
3 $12\frac{1}{2}$ for dyeing.

$16 $87\frac{1}{2}$ whole cost.

Then $100 : $112 : : $16 $87\frac{1}{2}$*cts.* : $18 90*cts.* Ans.

13) Thus 1*cwt.* : 1*lb.* : : $7+$3 : 8*cts.* 9*m.* Ans.

14) Thus, paid 23*cts.* per *lb.*
Sold it for 19

Lost 4*cts.* per *lb.*

Then as 1*lb.* : 702*lbs.* : : 4*cts.* : $28 08*cts.* Ans.

(15) Thus $2 23*cts.* : $2 75*cts.* : : $110 : $135 65*cts.*
And $135 65*cts.*—$100=$35 65*cts.*=$35\frac{2}{3}$ nearly. Ans.

(16) Thus $100 : $125 : : $2 10*cts.* : $2 $62\frac{1}{2}$*cts.* what 1 box sold for.
Then as $3 50*cts.* price of 1*cwt.* : $2 $62\frac{1}{2}$*cts.* price of 1 box : : 112*lbs.* : 84*lbs.* Ans.

(17) First, 16*pie.* × $14=$224 the prime cost.
And 5*pie.* × $17=$85
6*pie.* × $15=$90

$175 received back again.

Then as $100 : $112 :: $224 : $250 88*cts.* price of the whole with rate per cent. added.—175 00

5)75 88 price of the 5 pieces.

Ans. $15 17 6 per *pie.*

(18) Thus $500—$410=$90 gain on the whole.
Then as 372*lbs.* : 1*lb.* :: $90 : 24*cts.* 1*m.*+ Ans.

(19) Thus $1 : $100 :: 5*cts.* : $5 00 the Ans.

(20) First, $1 05*cts.* × 510=$535 50*cts.* prime cost.
And $1 30*cts.* × 510=$663 00*cts.* sold for.

mo. $
3 | $\frac{1}{4}$ | 6
1 50
100 00

$101 50

Then $101 50*cts.* : $100 :: $663 : $653 20*cts.*+
Hence $653 20*cts.*—$535 50*cts.*=$117 70*cts.* Ans.

FELLOWSHIP.

EXAMPLES.

CASE 1.

(2) Thus D.'s stock $500
E.'s 400
F.'s 300
Sum 1200

$ $ $ $
Then as 1200 : 500 :: 300 : 125=D.'s
And 1200 : 400 :: 300 : 100=E.'s } Ans.
And 1200 : 300 :: 300 : 75=F.'s

(3) Thus A. $1200
B. 500
C. 700
Whole debt $2400

$ $ $ $
Then as 2400 : 1200 :: 1800 : 900 A.'s
as 2400 : 500 :: 1800 : 375 B.'s } Ans
as 2400 : 700 :: 1800 : 525 C.'s

$1800 proof.

(4) Thus A. had 50 *cattle.*
B. 80
C. 70
Sum 200

cattle. cattle. $ $
Then as 200 : 50 :: 60 : 15 A.'s
as 200 : 80 :: 60 : 24 B.'s } Ans.
as 200 : 70 :: 60 : 21 C.'s

$60 proof.

(5) Thus, to A. $ 120
B. 250 75
C. 300
D. 208 25

Sum 879 00

$$\begin{array}{l}\text{Then}\\ \text{As }\$879 : \$650\end{array}\left\{\begin{array}{lll} ::120 & : & 88\ 75+=\text{A.'s sh.}\\ ::250\ 75 & : & 185\ 42+=\text{B.'s sh.}\\ ::300 & : & 221\ 84+=\text{C.'s sh.}\\ ::208\ 25 & : & 153\ 99+=\text{D.'s sh.}\end{array}\right\}\text{Ans.}$$

(6) Thus A. is to have 1 portion.
B. 2
C. 6

9 sum of the portions.

$$\text{Then as}\left\{\begin{array}{l} \overset{p.}{9} : \overset{p.}{1} :: \overset{\$.}{900} : \overset{\$}{100}=\text{A.'s share.}\\ 9 : 2 :: 900 : 200=\text{B.'s share.}\\ 9 : 6 :: 900 : 600=\text{C.'s share.}\end{array}\right\}\text{Ans.}$$

(7) Thus, he owes to A. $ 250 50
B. 500 00
C. 349 50

Sum 1100 00

$$\begin{array}{l}\text{Then}\\ \text{As } 1100 : 960 ::\end{array}\left\{\begin{array}{l} \overset{\$}{250}\ \overset{cts.}{50} : \overset{\$}{218}\ \overset{cts.}{61}\ \overset{m.}{8}+\text{A.'s}\\ 500\ 00 : 436\ 36\ 3+\text{B.'s}\\ 349\ 50 : 305\ 01\ 8+\text{C.'s}\end{array}\right\}\text{Ans.}$$

EXAMPLES

CASE 2.

$$\begin{array}{lr} & \$ \\ \text{(1) Thus} & 88\times3=\ 264 \\ & 120\times4=\ 480 \\ & 300\times6=1800 \\ \text{Sum of stocks and time} & 2544 \end{array}$$

$$\text{Then as } \$2544 : \left\{\begin{array}{rrrrl} & & \$ & \$ & \$\ \textit{cts. m.} \\ 264 & :: & 184 : & 19 & 09\ \ 4=\text{L.'s} \\ 480 & :: & 184 : & 34 & 71\ \ 6=\text{M.'s} \\ 1800 & :: & 184 : & 130 & 18\ \ 8=\text{N.'s} \end{array}\right\} \text{Ans.}$$

$$\begin{array}{lr} & \$\quad \textit{m.}\quad \$ \\ \text{(2)} & 580\times3=1740 \\ & +100 \\ & 680\times9=6120 \\ \text{A.'s product} & 7860 \end{array}$$

$$\begin{array}{lr} & \$\quad \textit{m.}\quad \$ \\ & 1000\times9=9000 \\ & +200 \\ & 1200\times3=3600 \\ \text{B.'s product} & 12600 \end{array}$$

$$\begin{array}{lr} & \$\quad \textit{m.}\quad \$ \\ & 480\times3=1458 \\ & -300 \\ & 180\times2=372 \\ & +500 \\ & 686\times3=2058 \\ & -400 \\ & 286\times1=286 \\ & +1000 \\ & 1286\times3=3858 \\ \text{C.'s product} & 8032 \end{array}$$

$$\begin{array}{lr} & \$ \\ \text{A.'s} & 7860 \\ \text{B.'s} & 12600 \\ \text{C.'s} & 8032 \end{array}$$

$$\begin{array}{l} \quad\quad\quad\ \ \$\quad \textit{cts.} \\ 28492 : 2108\ \ 44 :: \end{array} \left\{\begin{array}{rcl} \$ & & \$\ \ \textit{cts. m.} \\ 7860 & : & 581\ \ 64\ \ 8+\text{A} \\ 12600 & : & 932\ \ 41\ \ 4+\text{B} \\ 8032 & : & 594\ \ 37\ \ 7+\text{C} \end{array}\right\} \text{Ans.}$$

EXCHANGE.

DOMESTIC EXCHANGE.

(1) Thus, £63 14*s*. 6*d*.=15294*d*.÷72*d*. a dollar in Virginia=$212 41½*cts*. Ans.

(2) Thus, £230 10*s*. 7*d*.=55327*d*.÷96*d*. a dollar in New-York and N. Carolina=$576 32*cts*. 2*m*. Ans

(3) Thus, $150

90*d*.=a doll. Penn. cur.

12)13500*d*.

2|0)112|5

£56 5*s*. Ans.

(4) Thus, $377 40*cts*.

72*d*.=a doll. Mass. cur.

754 80

26418 0

12)27172 80

2|0)226|4 4*d*.

£113 4*s*. 4*d*. Ans.

(5) Thus, $389 45*cts*.

56*d*.=a doll. in Georgia.

233670

194725

12)21809|20

2|0)181|7 5

£90 17*s*. 5*d*.

FOREIGN EXCHANGE.

EXAMPLES.

(2) Thus £1 : £76 : : $4 10*cts.*=£1 Irish : $311 60 *cts.* Ans.

(3) Thus $1 24*cts.* = 1 milrea : $532 33*cts.* : : 1*m.* : 429*m.* 298*reas.*+ Ans.

(4) Thus 66*cts.* : $1869 : : 1*ru.* : 2831$\frac{9}{11}$*ru.* Ans.

(5) Thus 1*g.* : 165*g.* : : 39*cts.* : $64 35*cts.* Ans.

(6) Thus 33*cts.* 5*m.*=1*m. b.* : $280 58*cts.* 5*m.* : : 1*m. b.* : 837*m. b.*+ Ans.

(7) Thus 1*li.* : 562*li.* : : 18*cts.* 5*m.*=1*li.* : $103 97*cts.* Ans.

(8) Thus 10*cts.*=1*rial plate* : $463 : : 1*rial* : 4630*rials.* Ans.

(9) Thus 1*flo.* : 40*cts.* : : 591*flo.* 17*st.* : $236 74*cts.*
Or 1*st.* : 2*cts.* : : 591*flo.* 17*st.* : $236 74*cts.*
Then $100 : $160 : : $236 74*cts.* : $378 78*cts.*+ Ans.

(10) Thus as 100*cr.*+25 ; 100*b.* : : 2464*m. b.* : 1971*m. b.* 3*sch.* 2$\frac{2}{5}$*pen.* Ans.

(11) Thus 1*cr.* : 32$\frac{1}{2}$*d.* : : 2000*cr.* : £270 16*s.* 8*d.* Ans.

(12) Thus as 1*pi.*=8*ri.* : 36*d.* : : $1676 6*ri.*=16766*ri.* : £314 7*s.* 3*d.* Ans.

(13) Thus 1*pez.*=20*sol.* : 54*d.* : : 3940*pez.* 15*sol.* : £886 13*s.* 4$\frac{1}{2}$*d.* Ans.

(14) Thus 1*ru.* : 4*s.* 3*d.* : : 2586*ru.* : £549 10*s.* 6*d.* Ans.

(15) First £1 : £450 15*s.* : : 34*s.* 6*d* 186610$\frac{1}{2}$*pence.*
Or 20*s.* : 9015*s.* : : 414*d.* : 186610$\frac{1}{2}$*pence* Flemish, or groots.
Then 50*st.*=100*d.* : 186610$\frac{1}{2}$*d.* : : 1*ru.* : 1866*ru.* 10$\frac{1}{2}$ *cop.* Ans.

(16) Thus as £108 6*s.* 8*d.* Irish : £100*str.* : : £813 3*s* 6*d.* : £750 12*s.* 6*d.* Sterling. Ans.

(17) First 20*s.* : 33*s.* 6*d.* : : 5*s.* : 8*s.* $4\frac{1}{2}$*d.*
Then 5*s.* : 8*s.* $4\frac{1}{2}$*d.* : : $32\frac{1}{2}$*d.* : $54\frac{7}{16}$*d.* Flemish. Ans

(18) Thus $32\frac{1}{2}$*d.* : $54\frac{7}{16}$*d.* : : 5*s.* : 8*s.* $4\frac{1}{2}$*d.*
Then as 5*s.* : 8*s.* $4\frac{1}{2}$*d.* : : 20*s.* : 33*s.* 6*d.* Ans.

$$\begin{array}{l|c|c|l} & s. & & s.\ \ d. \\ \text{(19) Thus} & 5 & \frac{1}{4} & 33\ \ 6 \\ \cline{4-4} & & & 8\ \ 4\frac{1}{2} \end{array}$$

8 $4\frac{1}{2}$=value of a crown at that rate.
Then 8*s.* $4\frac{1}{2}$*d.* : 5*s.* : : $54\frac{7}{16}$*d.* : $32\frac{1}{2}$*d.* Ans.

(20) Thus $32\frac{1}{4}$*d.* : 32*d.* : : 36*s.* 6*d.* : 36*s.* $2\frac{26}{43}$*d.* Ans.

(21) Thus 51*d.* : 53*d.* : : 42*d.* : $43\frac{11}{17}$*d.* Ans.

VULGAR FRACTIONS.

REDUCTION OF VULGAR FRACTIONS.

EXAMPLES.

CASE 1.

(2) Numer. 108)144(1
108
———
Common measure 36)108(3
108
———
Then 36)$\frac{108}{144}=\frac{3}{4}$. Ans.

(4) Numer. 126)234(1
126
———
108)126(1
108
———
Common measure 18)108(6
108
———
Then 18)$\frac{126}{234}=\frac{7}{13}$. Ans.

CASE 2.

(2) $45 \times 3 + 2 = \frac{137}{3}$. Ans.

(3) Thus $1564 \times 5 + 3 = \frac{7823}{5}$. Ans.

CASE 3.

(2) Thus $67 \div 7 = 9\frac{4}{7}$. Ans.

(3) Thus 16)364(22$\frac{12}{16}$. Ans.
32
—
44
32
—
12
—

CASE 4.

(2) Thus $6 \times 8 \times 11 \times 13 = 6864$ numer.
And $7 \times 9 \times 12 \times 17 = 12852$ denom. $= \frac{572}{1071}$. Ans.

(3) Thus $7 \times 15 \times 8 \times 6 = 5040$ numer.
And $12 \times 19 \times 11 \times 13 = 32604$ denom. $= \frac{420}{2717}$. Ans.

CASE 5.

(2) Thus 5)5 20 10 15 the denominators.
2)1 4 2 3
1 2 1 3

Then $5 \times 2 \times 1 \times 2 \times 1 \times 3 = 60$ common denom.

Then the com. denom.
$$\left.\begin{array}{l} 60 \div 5 = 12 \times 4 = 48 \\ 60 \div 20 = 3 \times 9 = 27 \\ 60 \div 10 = 6 \times 7 = 42 \\ 60 \div 15 = 4 \times 4 = 16 \end{array}\right\}\text{numer.}$$

That is $\frac{48}{60}$ $\frac{27}{60}$ $\frac{42}{60}$ $\frac{16}{60}$. Ans.

(3) Thus 2)10 2 9 the denom.

5 1 9

Then 2×5×1×9=90 common denom.

$$\left.\begin{array}{l} 90\div10=\ 9\times9=81 \\ 90\div\ 2=45\times1=45 \\ 90\div\ 9=10\times5=50 \end{array}\right\}\text{numer.}$$

That is $\frac{81}{90}$ $\frac{45}{90}$ $\frac{50}{90}$. Ans.

CASE 6.

(2) First 1*lb.* troy=240*dwt.* therefore $\frac{3}{5}$ of $\frac{1}{240}=\frac{3}{1200}=\frac{1}{400}$*lb.* Ans.

(3) Thus 3×1×1
And 8×4×4 $=\frac{3}{128}$. Ans.

(4) Thus 1*hhd.*=504*pts.* therefore $\frac{5}{8}$ of $\frac{1}{504}=\frac{5}{4032}$*hhd.* Ans.

(5) Thus 8*fur.*=1*m.* therefore 9×1=9 the numer. and 16×8=128 the denom.$=\frac{9}{128}$. Ans.

CASE 7.

(2) Thus 2×112=224 the numer. and 252×1=252 the denom.$=\frac{224}{252}=\frac{8}{9}$*lb.* Ans.

(3) $\frac{6}{1680}$ of £1$=\frac{6}{1680}$ of $\frac{241}{1}=\frac{1440}{1680}=\frac{6}{7}$*d.* Ans.

CASE 8

(2) Thus $\frac{7}{8}$ of a shilling$=\frac{7}{8}$ of $\frac{12}{1}=\frac{84}{8}=10\frac{1}{2}$*d.* Ans.

(3) Thus $\frac{12}{48}$ of a day$=\frac{12}{48}$ of $\frac{24}{1}=\frac{288}{48}$=6*hrs.* Ans.

(4) Thus $\frac{5}{16}$ of an acre$=\frac{5}{16}$ of $\frac{4}{1}$ of $\frac{40}{1}=\frac{800}{16}$ perches= 1*r.* 10*p.* Ans.

CASE 9.

(2) Thus 5*s.* 4*d.*=64*d.* and £1=240*d.* therefore $\frac{64}{240}=\frac{4}{15}$£. Ans.

(3) Thus 6*mo.* 2*w.*=26*w.* and 1*yr.*=52*w.* therefore $\frac{26}{52}$ of 1*yr.*=$\frac{1}{2}$*yr.* Ans.

(4) Thus 2*qrs.* 3*na.*=11*na.* and 1*yd.*=16*na.* therefore $\frac{11}{16}$*yd.* is the Ans.

ADDITION OF VULGAR FRACTIONS.

EXAMPLES.

(2) Thus $\frac{3}{13}+\frac{4}{13}+\frac{5}{13}+\frac{1}{13}=\frac{13}{13}=1$. Ans.

(3) Thus $\frac{4}{7}+\frac{3}{7}+\frac{6}{7}=\frac{13}{7}=1\frac{6}{7}$. Ans.

(4) Thus 5)5 10

1 2=10 common denom.

$$\text{And } \left.\begin{array}{r} 10\div\ \ 5\times2=4 \\ 10\div10\times5=5 \end{array}\right\}\text{numer.}$$

Whence $\frac{4}{10}+\frac{5}{10}=\frac{9}{10}$. Ans.

(5) Thus $3\frac{1}{4}=\frac{13}{4}$, $8\frac{2}{7}=\frac{58}{7}$, and 4×7×9=252 common denom.

$$\text{And } \left.\begin{array}{r} 252\div4\times13=\ \ 819 \\ 252\div7\times58=2088 \\ 252\div9\times\ \ 4=\ \ 112 \end{array}\right\}\text{numer.}$$

Whence $\frac{819}{252}+\frac{2088}{252}+\frac{112}{252}=\frac{3019}{252}=11\frac{247}{252}$. Ans.

(6) Thus $\frac{3}{6}$ of $\frac{5}{8}=\frac{15}{48}=\frac{5}{16}$, and $\frac{2}{4}$ of $\frac{7}{12}=\frac{14}{48}=\frac{7}{24}$.
Then 8)16 24

2 3=48 common denom.

$$\text{And } \left.\begin{array}{r} 48\div16\times5=15 \\ 48\div24\times7=14 \end{array}\right\}\text{numer.}$$

Whence $\frac{15}{48}+\frac{14}{48}=\frac{29}{48}$. Ans.

(7) Thus $\frac{1}{3}$ of $\frac{4}{1}$ of $\frac{40}{1}=\frac{160}{3}=53\frac{1}{3}$*per.*=1*r.* $13\frac{1}{3}$*p.*
And $\frac{7}{10}$ of $\frac{40}{1}=\frac{280}{1}$=28*p.*
Whence 1*R.* $13\frac{1}{3}$*p.*
0 28

Ans. 2 $1\frac{1}{3}$

MULTIPLICATION OF VULGAR FRACTIONS.

EXAMPLES.

(2) $\frac{2}{10}$ by $\frac{1}{3}$ thus $\frac{2\times1=2}{10\times3=30}=\frac{1}{15}$. Ans.

(3) Thus $6\frac{2}{4}=\frac{26}{4}$ by $\frac{1}{7}=\frac{26\times1=26}{4\times7=28}=\frac{13}{14}$. Ans.

(4) $4\frac{3}{4}=\frac{19}{4}$ by $\frac{2}{3}=\frac{19\times2=38}{4\times3=12}=3\frac{2}{12}=3\frac{1}{6}$. Ans.

SUBTRACTION OF VULGAR FRACTIONS.

EXAMPLES.

(2) Thus $\frac{1}{7}$ of $\frac{1}{4}=\frac{1}{28}$ whence $\frac{19}{20}-\frac{1}{28}$.

$$\begin{array}{l} 4\underline{)20\quad 28} \\ \quad 5\quad 7=140 \text{ common denom.} \end{array}$$

$$\left.\begin{array}{l} 140\div20\times19=133 \\ 140\div28\times\ 1=\quad 5 \end{array}\right\}\text{numer.}$$

Whence $\frac{133}{140}-\frac{5}{140}=\frac{128}{140}=\frac{32}{35}$. Ans.

(3) Thus $1\times14=14$ common denom.

$$\text{And }\left.\begin{array}{l} 14\div\ 1\times5=70 \\ 14\div14\times8=\ 8 \end{array}\right\}\text{numer.}$$

Whence $\frac{70}{14}-\frac{8}{14}=\frac{62}{14}=4\frac{6}{14}$. Ans.

(4) Thus $\frac{2}{3}$ of a league$=\frac{2}{3}$ of 3 miles$=$2 miles.

And $\frac{7}{10}$ of a mile$=\frac{7}{10}$ of 8 furlongs$=\frac{56}{10}=5\frac{6}{10}$ furlongs$=$5 furlongs 24 poles.

Therefore 2*m.*—5*fur.* 24*po.*=1*m.* 2*fur.* 16*po.* Ans.

(5) Thus $5\frac{3}{4}=\frac{23}{4}$ and $2\frac{2}{3}=\frac{8}{3}$ therefore $4\times3=12$ com. d.

$$\text{And }\left.\begin{array}{l} 12\div4\times23=69 \\ 12\div3\times\ 8=32 \end{array}\right\}\text{numer.}$$

Whence $\frac{69}{12}-\frac{32}{12}=\frac{37}{12}=3\frac{1}{12}$. Ans.

(6) Thus ^{2} of $\frac{7}{16}=\frac{14}{48}$ and $\frac{1}{4}$ of $\frac{3}{5}=\frac{3}{20}$.

$$\begin{array}{l} \text{And } 4\underline{)48\quad 20} \\ \qquad\quad 12\quad 5=240 \text{ common denom.} \end{array}$$

$$\text{And }\left.\begin{array}{l} 240\div48\times14=70 \\ 240\div20\times\ 3=36 \end{array}\right\}\text{numer.}$$

Whence $\frac{70}{240}-\frac{36}{240}=\frac{34}{240}=\frac{17}{120}$. Ans.

DIVISION OF VULGAR FRACTIONS.

EXAMPLES.

(2) $\frac{5}{9}$ by $\frac{3}{1}$ thus $\frac{1}{3})\frac{5}{9}(\frac{5}{27}$. Ans.

(3) $6\frac{2}{5}=\frac{33}{5}\div\frac{1}{3}$ thus $\frac{3}{1})\frac{33}{5}(\frac{99}{5}=19\frac{4}{5}$. Ans.

(4) Thus $\frac{2}{3}$ of $\frac{3}{4}=\frac{6}{12}$ and $\frac{1}{2}$ of $\frac{2}{3}=\frac{2}{6}$.
Then $\frac{6}{12}\div\frac{2}{6}$ thus $\frac{6}{2})\frac{6}{12}(\frac{36}{24}=1\frac{1}{2}$. Ans.

(5) $\frac{1}{6}$ by $\frac{3}{4}$ thus $\frac{4}{3})\frac{1}{6}(\frac{4}{18}=\frac{2}{9}$. Ans.

(6) $\frac{2}{3}$ of $\frac{7}{8}=\frac{14}{24}$ and $\frac{1}{7}$ of $\frac{1}{4}=\frac{1}{28}$.
Then $\frac{14}{24}$ by $\frac{1}{28}$ thus $\frac{28}{1})\frac{14}{24}(\frac{392}{24}=16\frac{1}{3}$. Ans.

(7) $\frac{1}{2}$ of $17\frac{1}{2}=\frac{1}{2}$ of $\frac{35}{2}=\frac{35}{4}$.
Then $\frac{35}{4}\div\frac{3}{4}$ thus $\frac{4}{3})\frac{35}{4}(\frac{140}{12}=11\frac{2}{3}$. Ans.

(8) Thus $\frac{3}{4}$ of $91\frac{78}{97}=\frac{3}{4}$ of $\frac{8905}{97}=\frac{26715}{388}$.
And $\frac{26715}{388}\div\frac{1036}{50}$ thus $\frac{50}{1036})\frac{26715}{388}(\frac{1335750}{401968}=3\frac{64923}{200984}$.
Ans.

RULE OF THREE IN VULGAR FRACTIONS.

EXAMPLES.

(2) Thus $3\frac{1}{4}$*yds.*$=\frac{13}{4}$ and $9\frac{3}{4}$*s.*$=\frac{39}{4}$ and $4\frac{3}{4}$*yds.*$=\frac{19}{4}$.
Then we have $\frac{13}{4}:\frac{39}{4}::\frac{19}{4}:$ 14*s.* 3*d.*
For $\frac{39}{4}\times\frac{19}{4}=\frac{741}{16}$*s.*$\div\frac{4}{13}=\frac{2964}{208}=$14*s.* 3*d.* Ans.

(3) Thus $\frac{5}{4}:\frac{20}{1}::\frac{3}{4}:$ 12*yds.*
For $\frac{20}{1}\times\frac{3}{4}=\frac{60}{4}\div\frac{4}{5}=\frac{240}{20}$*yd.*=12*yds.* Ans.

(4) Thus $27\frac{3}{4}\times 4$*pe.*=111*yds.* and $15\frac{2}{3}$*s.*=15*s.* 8*d.*
Then say as in whole numbers, 1*yd.* : 111*yds.* :: 15*s.* 8*d.* : £86 19*s.*
For 15*s.* 8*d.*=188*d.*×111*yds.*=20868*d.* which÷12 ÷20=£86 19*s.* Ans.

(5) Thus $5\frac{3}{7}$*cwt.*$=\frac{38}{7}$ and £$31\frac{14}{32}=\frac{1006}{32}$.
Then we have $\frac{38}{7}:\frac{2}{5}::\frac{1006}{32}:$ £2 6*s.* $3\frac{18}{19}$*d.*
For $\frac{1006}{32}\times\frac{2}{5}=\frac{2012}{160}\div\frac{7}{38}=\frac{14084}{6080}$£.=£2 6*s.* $3\frac{18}{19}$*d.* Ans.

(6) First $1\frac{3}{5}lb.=\frac{8}{5}$.
Then $\frac{1}{3}lb. : \frac{5}{8} :: \frac{4}{7}dol. : \$2\ 74\frac{2}{7}cts.$
For $\frac{8}{5}\times\frac{4}{7}=\frac{32}{35}\div\frac{3}{1}=\frac{96}{35}dol.=\$2\ 74\frac{2}{7}cts.$ Ans.

(7) Thus $20\frac{2}{3}d.=\frac{62}{3}$.
Then inversely thus $6m. : 10m. :: \frac{62}{3}day. : 34\frac{4}{9}days.$
For $\frac{62}{3}\times\frac{10}{1}=\frac{620}{3}\div\frac{1}{6}=\frac{620}{18}=34\frac{4}{9}days.$ Ans.

(8) First $\frac{1}{3}$ of $2\frac{1}{2}cwt.=\frac{1}{3}$ of $\frac{5}{2}=\frac{5}{6}$ of a *cwt.*
Then this reduced to *lbs.* would be $\frac{5}{6}$ of $\frac{112}{1}=\frac{560}{6}$.
Then we have $6\frac{1}{2}lbs.=\frac{13}{2} : \frac{560}{6} :: \frac{3}{4} : \$10\ 76\frac{12}{13}cts$
For $\frac{560}{6}\times\frac{3}{4}=\frac{1680}{24}\div\frac{13}{2}=\frac{3360}{312}dol.=\$10\ 76\frac{12}{13}cts.$

DECIMAL FRACTIONS.

ADDITION OF DECIMALS.

EXAMPLES.

(5)
56.12
.7
1.314
5837.01
.15
Ans. 5895.294

(6)
361.04
.120
78.0006
101.54
8.943
.3
Ans. 549.9436

MULTIPLICATION OF DECIMALS.

EXAMPLES.

(2)
54.20
38.63
16260
32520
43360
16260
Ans. 2093.7460

(3)
4560.
.3720
91200
31920
13680
Ans. 1696.3200

(4)
.28043
.0005

Ans. .000140215

SUBTRACTION OF DECIMALS.

EXAMPLES.

(5)
13.16421
4.286

Ans. 8.37821

(6)
5960.
.3742

Ans. 5959.6258

DIVISION OF DECIMALS.

EXAMPLES.

(2) 4 20)148.63(35.304+ Ans.
1263

2233
2105

1280
1263

1700
1684

16 rem.

(3) 3.2).2142(.066+ Ans.
192

222
192

30 rem.

(4) 931)2.00385(.0021523+ Ans.
1862

1418
931

4875
4655

2200
1862

3380
2793

587 rem.

REDUCTION OF DECIMALS.

CASE 1.

(2) 8)7.000
.875 Ans.

(3) 24)170(.70833+
168
200
192
80
72
80
72
8 rem.

(4) 2162.)3810(.1762+ Ans.
2162
16480
15134
13460
12972
4880
4324
556 rem.

(5) 254)1160(.4566+ Ans.
1016
1440
1270
1700
1524
1760
1524
236 rem.

CASE 2.

(2) Thus 2*R*. 4*P*.=84*P*. 1*A*.=160*P*.
Then 160)840(.525 Ans.
800

400
320

800
800

(3) 2*qr*. 2*na*.=10*na*. And 1*yd*.=16*na*.
Then 16)100(.625. Ans.
96

40
32

80
80

(4) 1*hr*.=60*min*. And 60)5.00(.08333+ Ans
480

200
180

200
180

200
180

20 rem.

(5) 1*oz*.=480*grs*.
Then 480)1000(.02083+ Ans.
960

4000
3840

1600
1440

160 rem.

(6) *2qts. 1pt.*=5*pts.*
1*hhd.*=504*pts.* Then 504)5000(.00992+ Ans.
4536
4640
4536
1040
1008
32 rem.

CASE 3.

£
(2) .1361
20
*s.*2.7220
12
*d.*8.6640
4
*qr.*2.6560
Ans. *s. d.* 2 $8\frac{1}{2}$

Day.
(3) .235
24
940
470
*hrs.*5.640
60
*min.*38.400
60
*sec.*24.000 Ans. *hrs. min. sec.* 5 38 24

Gal.
(4) .42
4
*qt.*1.68
2
*pt.*1.36 Ans. *qt. pt.* 1 1.36

s.
(5) .253
12
*d.*3.036 Ans. *d.* 3.036

Yd.
(6) .436
4
*qr.*1.744
4
*na.*2.976 Ans. *qr. na.* 1 2

Acre.
(7) 9
4
*r.*3.6
40
*p.*24.0 Ans. *R. P.* 3 24

RULE OF THREE IN DECIMALS.

EXAMPLES.

2) Thus 1.4*yd.* : 15.*yd.* : : 13*s.* : £6 19*s.* 3*d.* 1.71*qr.*
For 13 × 15 = 195. the dividend.
Then 195 ÷ 1.4 = £6 19*s.* 3¼.71*qr.*

3) Thus 1*qr.* : 1*yd.* : : \$2 34.5*cts.* : \$9 38*cts.*
For 2. 34.5 × 4 = \$9 38*cts.* Ans.

4) First sold it for \$108.30*cts.*
but paid for it 84.39.12—

gained on it \$23.90.88

.Then 10.5*cwt.* : 1*cwt.* : : \$23 90*cts.* 88*m.* : \$2 27*cts.* 7*m.*+
For 23 .90 88 ÷ 10.5 = \$2 27*cts.* 7*m.* Ans.

(5) Thus \$20.8 : \$12.6 : : 240*pie.* : 145.38*pie.*+
For 240 × 12.6 = 3024.0 which ÷ 20.8 = 145.38*pie.*+ Ans.

(6) Thus 3.5*oz.* : 5.2*oz.* : : 74.6*cts.* : \$1 10*cts.* 8*m.*
For 5.2 × 74.6 ÷ 3.5 = \$1 10*cts.* 8*m.*

◆

POSITION.

SINGLE POSITION.

EXAMPLES.

(2) Suppose \$162 in the box.

$\frac{1}{5}$ | 32.40 = $\frac{1}{5}$
$\frac{1}{6}$ | 27.00 = $\frac{1}{6}$
$\frac{1}{8}$ | 20.25 = $\frac{1}{8}$
$\frac{1}{12}$ | 13.50 = $\frac{1}{12}$

Result 93.15

Then \$93 15*cts.* : \$162 : : \$690 : \$1200. Ans.

(3) Suppose C.'s 40

$$\begin{array}{r@{}l} 40 & \\ +8 & \\ \hline 48 & =\text{B.'s} \\ +16 & \\ \hline 64 & =\text{A.'s} \\ 48 & =\text{B.'s} \\ 40 & =\text{C.'s} \\ \hline 152 & \text{ result.} \\ \hline \end{array}$$

$$\text{Then } 152\,\textit{yrs.} : \left\{\begin{array}{l} \overset{\textit{yrs}}{64} :: \overset{\textit{yrs.}}{133} : \overset{\textit{yrs.}}{56}=\text{A.'s} \\ 48 :: 133 : 42=\text{B.'s} \\ 40 :: 133 : 35=\text{C.'s} \end{array}\right\} \text{Ans.}$$

$$\begin{array}{r@{}l} \hline 133 & \text{ proof.} \\ \hline \end{array}$$

(4) Suppose No. 3 cost $ 20

$$\begin{array}{r@{}l} \$ & \\ 20 & \\ 3 & \\ \hline 60 & =\text{No. 2.} \\ 2 & \\ \hline 120 & =\text{No. 1.} \\ 60 & \\ 20 & \\ \hline \text{Result } 200 & \\ \hline \end{array}$$

$$\text{Then } 200 : \left\{\begin{array}{l} \overset{\$}{120} :: \overset{\$}{350} : \overset{\$}{210}=\text{No. 1.} \\ 60 :: 350 : 105=\text{No. 2.} \\ 20 :: 350 : 35=\text{No. 3.} \end{array}\right\} \text{Ans.}$$

Yrs.

(5) Suppose 60

2

120

3

5)360

3)72

24 result.

Then 24*yrs.* : 60*yrs.* : : 14*yrs.* : 35*yrs.* Ans.

£

(6) Thus suppose 40

$5\frac{3}{4}$

200

20

10

Int. for 1*yr.* {£2|30

20

*s.*6|00}

Then as £10 14*s.* 8*d.* : £201 5*s.* : : £40 : £750. Ans.

£ *s.*

And |½|2 6

4 years.

Int. in 4 yrs. 9 4

Int. for 8 mo. {|½|1 3

0 7 8}

Whole int. 10 14 8

(7) Thus, suppose the cistern to hold 100 gallons.

Then 100÷45*min.*=$2\frac{2}{9}$*gal.*=the quantity which the first cock discharges in a minute.

And 100÷55*min.*=$1\frac{9}{11}$*gal.* the quantity which the second cock discharges in 1*min.*

Then 100÷30*min.*=$3\frac{1}{3}$*gal.*=the quantity which the discharging cock discharges in 1*min.* Consequently, $2\frac{2}{9}$*gal.*+$1\frac{9}{11}$*gal.*=$4\frac{4}{99}$*gal.* the quantity which the cistern receives by both the first and second cocks in a minute. Then as $3\frac{1}{3}$*gals.* run out in the same time, $4\frac{4}{99}$*gal.*—$3\frac{1}{3}$*gal.*=$\frac{70}{99}$*gal.* that the cistern gains in 1*min.*

Then $\frac{70}{99}$*gal.* : 100*gal.* : : 1*min.* : *2hrs. 21min. 25$\frac{5}{7}$sec.* Ans.

DOUBLE POSITION.

(2) First suppose they received $ 276

2

3)552

184=what A. spent.

+250

434=what B. spent.

—276

158 B. was in debt every year.

7

1106=7 years' debt.

—350

756 error too much.

$
Again suppose the salary was 300
2
3)600
200=A. spent.
+250
450 B. spent.
—300
B. was every year 150 in debt.
7
And in 7 years he was 1050 in debt.
—350
700 error too much.

Then 756×300=226800
700×276=193200

Difference of errors 56)33600($600 the salary, $\frac{2}{3}$ of which=400 A.'s share, then 400+250=650 B.'s share. Ans.
336
00

(3) First suppose 30 working days.
1
$30
—10 that he forfeits.
Receives 20
27 50
7 50 error too little.

Again suppose 20 working days.
1
-
$20
Forfeits 15
—
Receives 5
27 50
—
22 50 error too little.
—
Then 2250×30=67500
750×20=15000
—
Difference of errors 1500)52500(35 working days.
4500
—
7500
7500
—
Therefore 50—35=15 idle days. Ans.

$
(4) First suppose 10 cows=160
And 10 oxen=240
40 calves=240
—
The whole 640
—320
—
320 error too much.
—
$
Again suppose 8 cows=128
And 8 oxen=192
And 32 calves=192
—
The whole 512
320
—
192 error too much.
—

Then 320×8=2560
192×10=1920

Difference of errors 128)640(5*cows* 5*oxen* & 20*calves.*
640 Ans.

(5)

First suppose	Again suppose
Ft.	*Ft.*
No. 2=20	No. 2=30
$10=\frac{1}{2}$	$15=\frac{1}{2}$
15	15
25=No. 3.	30=No. 3.
+15	+15
40	45=No. 2.
—20	—30
20 error too much.	15 error too much.

Then 20×30=600
15×20=300

Difference of errors 5)300

60=No. 2, then 60—15=45=No. 3.

And then we have No. 1=15, No. 2=60, and No. 3=35, which added together=120*ft.* the length of the pole. Ans.

(6) Thus first suppose the whole property to have been worth £

396	Again suppose £ 432
198=½	216=½
—40	—40
158=A.'s share.	176=A.'s
132=⅓	144=⅓
+12	+12
144=B.'s share.	156=B.'s
—80	—80
60=C.'s share.	76=C.'s
144	156
158	176
366 sum.	408 sum.
396	432
30 error of defect.	24 error of defect.

Then 432×30=12960
396×24= 9504

Difference of errors 6)3456

£576 Ans.

£
Then 576÷2—40=248 A.'s share.
204÷3+12=204 B.'s do.
204—80=124 C.'s do.

£576 proof.

(7) First suppose each boy received £ 3

$$\begin{array}{rl} & 2 \\ \hline 6 & = \text{share of each woman.} \\ 3 & \\ \hline 18 & = \text{share of each man.} \\ \hline \end{array}$$

$$\begin{array}{lr} & \pounds \\ \text{And } 19\times 3 = & 57 \\ 11\times 6 = & 66 \\ 7\times 18 = & 126 \\ \hline & 249 \\ & 172\ \ 19\ \ 4\tfrac{1}{4} \\ \hline & 76\ \ \ \ 0\ \ 7\tfrac{3}{4} \text{ error of excess.} \\ \hline \end{array}$$

Again suppose each boy received £ 1

$$\begin{array}{rl} & 2 \\ \hline 2 & \text{share of each woman.} \\ 3 & \\ \hline 6 & \text{share of each man.} \\ \hline \end{array}$$

$$\begin{array}{lr} & \pounds \\ \text{And } 19\times 1 = & 19 \\ 11\times 2 = & 22 \\ 7\times 6 = & 42 \\ \hline & 83 \\ & 172\ \ 19\ \ 4\tfrac{1}{4} \\ \hline & 89\ \ 19\ \ 4\tfrac{1}{4} \text{ error of defect.} \\ \hline \end{array}$$

	£	s.	d.		£	s.	d.
Now	89	19	$4\frac{1}{4}\times3=$		269	18	$0\frac{3}{4}$
	76	0	$7\frac{3}{4}\times1=$		76	0	$7\frac{3}{4}$
					345	18	$8\frac{1}{2}$

Which÷166 sum of errors=£2 1*s.* 8*d.*+=each boy's share, which×2=£4 3*s.* $4\frac{1}{4}$*d.*+ =each woman's share, which×3=£12 10*s.* $0\frac{3}{4}$*d.*+ =each man's share. Ans.

* * *

INVOLUTION, OR THE RAISING OF POWERS.

EXAMPLES.

(2) 14×14×14=2744. Ans.
(3) 2.8×2.8×2.8×2.8×2.8×2.8=481.890304. Ans.
(4) .263×.263×.263=.018191447. Ans.
(5) $\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}\times\frac{1}{4}=\frac{1}{65536}$. Ans.
(6) 401×401×401×401=25856961601. Ans.

* * *

EVOLUTION, OR THE EXTRACTING OF ROOTS.

SQUARE ROOT.

EXAMPLES.

(2) 39375655(6275 Ans.	(3) 1486.179010(38.55. Ans.
36	9
122)337	68)586
244	544
1247)9356	765)4217
8729	3825
12545)62755	7705)39290
62725	38525
Rem. 30	Rem. 76510

(4) 96385163(9817 Ans.
81
188)1538
1504
1961)3451
1961
19627)149063
137389
Rem. 11674

(5) .0001324960(.01151 Ans.
1
21)32
21
225)1149
1125
2301)2460
2301
Rem. 159

(6) 18.362147(4.285 Ans.
16
82)236
164
848)7221
6784
8565)43747
42825
Rem. 922

(7) $\frac{2450}{3200}=\frac{49}{64}$ whose square root is $\frac{7}{8}$. Ans.

(8) $36)\frac{1296}{1764}=\frac{36}{49}$ whose square root is $\frac{6}{7}$. Ans.

(9) 500)3200($\sqrt{}$.64(.8 Ans.
3000 64
2000
2000

(10) $50\times64+49=\frac{3249}{64}$.

Then $\dot{3}2\dot{4}9(\frac{57}{8}=7\frac{1}{8}$. Ans.
25
107).749
749

And $\sqrt{}$.64(.8 denominator.
64

(11) $30\times100+25=30.25$

Then $\dot{3}0.\dot{2}5(5.5=5\frac{5}{10}$. Ans.
25
105)525
525

(12) $\dot{1}2\dot{9}6(36$ Ans.
$3\times3=9$
66)396
396

(13) $\dot{1}6\dot{9}(13$ Ans.
1
23)69
69

(14) $\dot{3}0\dot{9}7\dot{6}0\dot{0}(1760$ *yds.*=1 *mile.* Ans.
1
27)209
189
346)2076
2076
00

(15) Thus 15×15=225
24×24=576

√801(28.3ft. Ans.
4

48)401
384

563)1700
1689

Rem. 11

(16) 212×212=44944*ft.*
And 20*yds.*=60×60= 3600*ft.*

41344(203.332*ft.* Ans.
2×2=4

403)1344
1209

4063)13500
12189

40663)131100
121989

406662)911100
813324

Rem. 97776

CUBE ROOT.

EXAMPLES.

(2) 7532641(196.02 Ans.
1

Defec. div. and squ. of 9=381 6532
+270=com. divisor =651 5859

Def. div. and squ. of 6=108336 673641
+3420=com. div. =111756 670536

Defective divisor 115248 3105000

Def. di. & sq. of .02=1152480004)3105000000
+11760=com. div.=1152491764)2304983528

Rem. 800016472

(3) 12.113847500(2.296 Ans.
2×2×2=8

Def. div. and squ. of 2=1204)4113
+120=com. divisor =1324)2648

Def. div. & sq. of 9=145281)1465847
+5940=com. di. =151221)1360989

Def. di. & sq. of 6=15732336)104858500
+61830=co. di. =15773556) 94641336

Rem. 10217164

(4) 5382674(175.2 Ans.
1

Defec. div. and square of 7=349)4382
+210=complete divisor =559)3913

Defec. div. & square of 5=86725)469674
+2550=complete divisor=89275)446375

Defec. div. and squ. of 2=9187504)23299000
+10500=com. divisor =9198004)18396008

Rem. 4902992

(5) .378621350(.723. Ans.
7×7×7=343

Defec. div. & sq. of 2=14704)35621
+420=com. divisor =15124)30248

Def. div. & squ. of 3=1555209)5373350
+6480=com. divi. =1561689)4685067

Rem. 688283

(6) 46.295363543(3.590 Ans.
3×3×3=27

Def. div. & sq. of 5=2725)19295
+450=com. divi. =3175)15875

Def. div. & sq. of 9=367581)3420363
+9450=com. di. =377031)3396279

Defective divisor 128881)24084543

(7) Thus 4)$\frac{208}{1036}=\frac{52}{259}$, which reduced to a decimal= .2007722

Then .200772200(.585 Ans.
125

Defec. divisor & squ. of 8=7564)75772
+200=complete divisor=8764)70112

Defec. div. and sq. of 5=1009225)5660200
+8700=comp. divisor=1017925)5089625

570575 Rem.

(8) Thus $\sqrt[3]{36\frac{26}{30}}=\sqrt[3]{36.}$[illegible]6666+(3.32 Ans.
3×3×3=27

Defec. div. & squ. of 3=2709)9866
+270=complete divi. =2979)8937

Defec. div. & squ. of 2=326704)929666
+198=com. divisor =328684)657368

Rem. 272298

* * *

ALLIGATION.

CASE I.

	cwt.		$	*cts.*		$	*cts.*
(2)	2	at	25		=	50	00
	4		20	50	=	82	00
	7		18	62½	=	130	37½
	13					$262	37½

Then as 13*cwt.* : 1*cwt.* :: $262 37½*cts.* : $20 18¼*cts.* Ans.

CASE 2.

(2)

$$\text{Mean rate } 50 \left\{\begin{array}{r} \textit{cts.} \\ 34 \\ 42 \\ 86 \\ 110 \end{array}\right. \left.\begin{array}{l} \\ =36 \text{ at } \ \ 34 \text{ cts.} \\ =60 \text{ at } \ \ 42 \text{ cts.} \\ =16 \text{ at } \ \ 86 \text{ cts.} \\ = \ 8 \text{ at } 110 \text{ cts.} \end{array}\right\} \text{Ans.}$$

CASE 3.

(2)

$$\text{Mean rate } 92 \left\{\begin{array}{r} \textit{cts.} \\ 75 \\ 86 \\ 94 \\ 105 \end{array}\right. \begin{array}{l} \\ = \ 2 \\ =13 \\ =17 \\ = \ 6 \end{array}$$

$$\begin{array}{rl} & \qquad\qquad\qquad \textit{lbs.} \\ \text{Then } 2 : 6 :: 13 : & 39 \text{ at } \ \ 86 \text{ cts.} \\ 2 : 6 :: 17 : & 51 \text{ at } \ \ 94 \text{ cts.} \\ 2 : 6 :: \ \ 6 : & 18 \text{ at } 105 \text{ cts.} \end{array} \left.\begin{array}{l} \\ \\ \\ \\ \end{array}\right\} \text{Ans.}$$

CASE 4.

(2)

$$\text{Mean rate } 145. \left\{\begin{array}{r} \textit{cts.} \\ 130 \\ 160 \\ 180 \end{array}\right. \begin{array}{lr} & \\ =15+35= & 50 \\ = & 15 \\ = & 15 \\ & \overline{80} \text{ sum of differ.} \end{array}$$

$$\begin{array}{r} \text{Then as } 80 : 50 :: 32 : 20 \text{ at } 130 \text{ cts.} \\ 80 : 15 :: 32 : \ \ 6 \text{ at } 160 \text{ cts.} \\ 80 : 15 :: 32 : \ \ 6 \text{ at } 180 \text{ cts.} \end{array} \left.\begin{array}{l} \\ \\ \\ \end{array}\right\} \text{Ans.}$$

ARITHMETICAL PROGRESSION.

CASE 1.

EXAMPLES.

(2) Thus 40—1=39
2 com. dif.
78
2=1st term.
80
2=1st term.
82 sum.
40
2)3280
$16.40 Ans.

(3) 10—1=9
4 com. dif.
36
+10=1st term.
1st Ans. 46 last term.
+10
56
10
2)560
280 2dAns.

(4) 75—1=74
2 common difference.
148
+6=1st term.
$1.54 for the last. 1st Ans.
6=1st term.
160 sum.
75
800
1120
2)12000
$60 00 in the whole. Ans.

CASE 2.

(2) Thus 175

—21

8—1=7)154

$22 common difference.

And 175+21=196 sum of extremes.

8 number of terms.

2)1568

784 whole sum.

Lastly 21+22= 43=2d payment.

43+22= 65=3d

65+22= 87=4th

87+22=109=5th

109+22=131=6th

131+22=153=7th

153+22=175=8th

763

21=1st payment.

$784 proof.

(3) Thus 49

—4

10—1=9)45

5 com. dif.

Then 49+4=53 sum of extremes.

10 number of terms.

2)530

Received $2.65 Ans.

GEOMETRICAL PROGRESSION

EXAMPLES.

(2) Thus power 1 2 3 4
Ratio 3 9 27 81
27 3d power

567
162

2187=7th power.
5=1st term.

1st Ans. 10935=last term.
3 ratio.

32805
−5=1st term.

Ratio less 1=2)32800

£16400 Ans. 2d

(3) Thus power 1 2 3 4 5 6 7 8 9
Ratio 2 4 8 16 32 64 128 256 512
512

1024
512
2560

262144=18th p.
4=2d do.

1048576=20th p.
1 1st term.

1048576=last term.
2 ratio.

2097152
1=1st term.

Ratio less 1=1)2097151

Ans. $20971.51*cts.*

COMPOUND INTEREST BY DECIMALS.

EXAMPLES.

(2) Thus, tabular number 1.2155062

750

607753100

85085434

911.6296500

Amount of £1 for 6*mo.* 1.024695 from table first.

45581482500

82046668500

54697779000

36465186000

18232593000

91162965000

£934.1423442067500

20

*s.*2.8468841350000

12

*d.*10.1626096200000

	£	*s.*	*d.*	
Amount	934	2	10+	
Principal	750	0	0	
Interest	184	2	10+	Ans.

CASE 2.

(1) Thus £695 13*s*. 9*d*.=695.6875£.
Then from tab. II. 1.2762815)695.68750(545£ 1*s*. 9*d*.+ Ans.

(2) Thus £260 5*s*. 3*d*.=260.2625£ which÷by 1.191016 from table II.=£218 10*s*. 5*d*.+ Ans.

ANNUITIES AT COMPOUND INTEREST.

CASE 1.

(2) The number from table III.=5.637093
200=annuity.

Amount for yearly payments=1127.4186 which × 1.014781 proper number for ½ yearly payment from table V.=$1144 08 2*m*.+ Ans.

CASE 2.

(2) Thus, the num. from tab. IV.=4.21236
£70 annuity.

$294 86 52 Ans. for yearly payments.

Then $294.8652 × 1.014781 from table V. = $299.22.3+*mills*. Ans. for ½ yearly payments.

And 294.8652×1.022257 for quarterly payments from the same table=$301.42.8+*mills*. Ans. for quarterly payments.

ANNUITIES IN REVERSION.

(2) Thus 9+4=13*yrs.*=9.98565 table IV.
4 do.=3.62989—

6.35576
120

1271152
635576

$762.69.1.2*m.* Ans.

PERPETUITIES AT COMPOUND INTEREST.

(2) Thus, ratio—1=1.06—1=.06)260.00

$4333.33.3*m.*+ Ans.

COMBINATION.

EXAMPLES.

(2) Thus 20×19×18×17×16×15×14×13×12×1=
1×2×3×4×5×6×7×8×9×10=
670442572800
————————=184756 Ans.

PERMUTATION.

EXAMPLES.

(2) Thus 1×2×3×4×5×6×7×8×9×10×11×12=
479001600 number of changes.
15 seconds.

2395008000
479001600

6|0)718502400|0 sec.

6|0)11975040|0 min.

365¼*d.*=8766 hrs.)1995840(227 yrs. 248 days. 6 hrs. Ans.

◆

DUODECIMALS.

ADDITION OF DUODECIMALS.

EXAMPLES.

	Ft.	*in.*	″	‴	⁗
(1)	10	5	6	11	6
	15	9	5	2	10
	18	4	1	7	9
	12	8	6	5	7
Ans.	57	3	8	3	8

	Ft.	*in.*	″	‴	⁗
(2)	37	8	10	6	9
	43	11	2	4	7
	19	7	5	3	8
	18	4	1	7	2
Ans.	119	7	7	10	2

(3)

	Ft.	*in.*	"
	16	8	0
	14	6	0
	17	9	2
Ans.	48	11	2

SUBTRACTION OF DUODECIMALS.

EXAMPLES.

	Ft.	*in.*	"	‴	⁗
(1) From	38	8	4	7	5
Take	15	11	6	9	3
Ans.	22	8	10	2	2

	Ft.	*in.*	"	‴	⁗
(2) From	720	3	8	1	6
Take	13	9	4	7	10
Ans.	706	6	3	5	8

(3)

	Ft.	*in.*	"	‴	⁗
From	475	7	2	0	0
Take	81	2	5	10	6
Ans.	394	4	8	1	6

MULTIPLICATION OF DUODECIMALS.

CASE I.

EXAMPLES.

(2)

	Ft.	*in.*	
	54	10	
	5	7	
	31	11	10
	274	2	
Ans.	306	1	10

(3)

	Ft.	*in.*	"	
	6	9	3	
		3	5	
	2	9	10	3
	20	3	9	
Ans.	23	1	7	3

CASE 2.

(2)

		Ft.	in.	"				
6	½	81	10	4				
				7×2=14				
		573	0	4				
				2				
		1146	0	8				
1	1/6	40	11	2				
4"	1/3	6	9	10	4			
1	¼	2	3	3	5	4		
			6	9	10	4		
		9)1196	7	9	7	8		
	Yds.	132	8	7	9	7	8	Ans.

(3)

in.		Ft.	in.	"	'''					
4	⅓	2	5	7	2					
1	¼	0	9	10	4	8				
3"	¼		2	5	7	2				
6'''	1/6			7	4	9	6			
4''''	1/18			1	2	9	7			
1	¼					9	10	4	8	
						2	5	7	2	
		1	1	0	8	5	4	11	10	contents of 1 sh.
										10×10×10=1000
		10	10	7	0	6	1	10	4	
									10	
		108	9	10	5	1	6	7	4	
									10	
	sq. ft.	1088	2	8	3	3	6	1	4	Ans.

PROMISCUOUS EXAMPLES.

(1) Thus A.'s 25 years.
+15
B.'s 40 years.
+12
C.'s 52 years. Ans.

(2) $ cts. $ cts.
Thus 220 50÷5=44 10 A.'s own share.
220 50÷6=36 75 B.'s do.
80 85 sum.
220 50
139 65=C.'s own share.

$ cts. $ cts. m.
Then 36 75÷2=18 37 5=½ B.'s share.
44 10
62 47 5=A.'s last share.

$ cts. m.
And 18 37 5
139 65
Ans. 158 02 5=C.'s last share.

(3) \$100—7½ : \$100 :: \$56 25*cts.* : \$60 81*cts.* 5*m.*+25.
For 5625×100=562500 the dividend.
And 100—7½=92½ the divisor.
Then 562500÷92½=\$60 81*cts.* 5*m.*+25. Ans.

(4) Thus B. gains 2 miles per hour.
Then as 2*m.* : 50*m.* :: 1*hr.* : 25*hrs.* 1st Ans.
Now as B. went at the rate of 10 miles per hour for 25 hours, 10×25=250 miles, the 2d Ans.

(5) Thus $\frac{5}{20}$=¼)750

187 50 whole price of the damaged.
100 loss.

87 50 what it sold for.

Then \$1 25*cts.* : \$87 50*cts.* :: 1*yd.* : 70*yds.*=quantity damaged.
And 70×4=280*yds.* the whole quantity.
70

210 undamaged.

And \$750 00*cts.* cost.
87 50 received for the damaged.

210*yds.* : \$662 50 :: 1 : \$3 15¼*cts.*+ Ans.

5) Thus 1000—1=999 number of terms—1.
1 ft. common difference.

999
2 ft. first term.

1001 last term.
2

1003 sum of the terms.
1000

2)1003000

3)501500 ft.

220)167166+2 ft.

8)759+186 yds.

94+*7fur.* 186*yds.* 2*ft.* Ans.

(7) Thus admit the wall to contain 3600 feet.
Then 20)3600(180 feet raised in a day by A. B. & C.
24)3600(150 B. C. & D.
30)3600(120 C. D. & A.
36)3600(100 A. B. & D.

3)550

183⅓ feet per day by altogether.

Then 183⅓
B. C. & D. 150

A. 33⅓

And 183⅓
C. D. & A. 120

B. 63⅓

And $183\frac{1}{3}$	And $183\frac{1}{3}$
A. B. & D. 100	A. B. & C. 180
C. $83\frac{1}{3}$	D. $3\frac{1}{3}$

days.
Then, feet per day by A. $33\frac{1}{3})3600(108$ for A. to do it in.
do. by B. $63\frac{1}{3})3600(56\frac{16}{19}$ B. do.
do. by C. $83\frac{1}{3})3600(43\frac{1}{5}$ C. do.
do. by D. $3\frac{1}{3})3600(1080$ D. do.
And $183\frac{1}{3})3600(19\frac{7}{11}$ days all working together. Ans.

		d.	*d.*
(8) Thus	4 crowns at	146 each	=584
	3 dolls.	108	=324
	2 ducats	136	=272
			1180*d.* sum.

And £1055 15*s.*=253380*d.*

$$\text{Then } 1180 : 253380 :: \left\{\begin{array}{l} \overset{d.}{584} : \overset{d.}{125402} \div \overset{d.}{146} = 858\frac{62}{73}\,cr. \\ 324 : \ \ 69572 \div 108 = 644\frac{5}{27}\,\$. \\ 272 : \ \ 58406 \div 136 = 429\frac{31}{68}\,duc. \end{array}\right\} \text{Ans.}$$

(9) Thus 9*m.* : 21*m.* :: \$332 50*cts.* : \$775 $83\frac{1}{3}$*cts.* Ans.
For 33250×21=698250 the dividend.
And 9=the divisor.
Then 698250÷9=\$775 $83\frac{1}{3}$*cts.*

(10) Thus 12
4

16*yrs.*=10.83777 Table IV.
Time of reversion 12 = 8.86325 do.

1.97452 difference.
720.25 annuity.

987260
394904
3949040
1382164

$1422.1480300

Or $1422 14*cts.* 8*m.*+ Ans.

(11)

	$	*cts.*	
3150 gigs÷7×5= 2250 wagons wh. ×6*cts.*=	135	00	for the wagons.
3150 gigs÷3×5= 5250 footmen wh. ×1*ct.*=	52	50	for footmen.
5250 footmen÷6×4 =3500 horsemen which×2*cts.*=	70	00	for horsemen.
3150 gigs at 4*cts.* per gig=	126	00	for gigs.
Amount of toll	383	50	Ans.

(12) Thus 15*gals.* in 3*min.*=5*gals.* per min. that run in. And 20÷5=4*gals.* that run out in a min. Consequently, the gain is 5—4=1*gal.* per min. which is 60*gals.* per hour.
Then 110—60=50*gals.* yet to run in.
Then 5*gals.* : 50*gals.* : : 1*min.* : 10*min.* Ans.

(13) Thus 264
6
mo.
|6|½|15 84 Int. for 1 year.
|3|½| 7 92
3 96
11 88 Int. for 9 months.
264 00
30 00 profit.
$305 88 for the whole.

lbs. $ *cts.* *m.*
Then 28*cwt.*=3136)30588(0 9 7+ Ans.
28224
23640
21952
Rem. 1688

(14) Thus, the proportions are A. 4, B. 5, C. 3=12.

$$\text{Then } 12 : 780 :: \left\{\begin{array}{l} 4 : \overset{\$}{260} \text{ A.'s share of profit} \\ 5 : 325 \text{ B.'s} \quad \text{do.} \\ 3 : 195 \text{ C.'s} \quad \text{do.} \end{array}\right\} \begin{array}{c}\text{1st}\\ \text{Ans.}\end{array}$$

$780 proof.

$ *mo.*
Then 260×5=1300
325×7=2275
195×9=1755
5330

Again 5330 : 5762 : : { 1300 : 1405 36 A.'s stock.
2275 : 2459 39 B.'s
1755 : 1897 25 C.'s

$5762 00 proof.

Now 2459 39
2087 00 B. received.

372 39 B.'s loss of stock.
And 325 00 do. of gain.

Ans. $697 39 A. & C. would gain.

(15) 100+$5\frac{3}{4}$=105 75
$ cts. m.
Then 105 75 : 100 : : 1000 : 945 62 6 cost C.
20 75 0 less.

$924 87 6 cost B.

Again 100
—5 50

94 50 : 100 : : $924 87*cts.* 6*m.* : $978 70*cts.* 4*m.* that the whole cost A. which÷20*hhds.*=$48 93*cts.* 5*m.*+per *hhd.* Ans.

(16) 10×11=110 sold for.
1× 7= 70 worth.

$40 gain of A.

$ cts. m.
And 110÷3= 36 66 6+paid cash.
110 00 0

$73 33 3 to pay in paper.

$ cts.
5 25
4 50

$0 75 B. gains.

Then 450 : 75 : : 73 33 3 : $12,22*cts.* 2*m.* gain of B. $40—$12.22.2=$27.77.8. Ans.

(17) Thus 21—14=7 years to be of age.
Then $1300
6
7800 int. for first year.
1300
1278 amount—100.
6
7668 int. second year.
1278
125468 amount—100.
6
752808 int. third year.
125468
12299608 amount—100.
6
73797648 int. fourth year.
12299608
12037584 amount—100.
6
72225504 int. fifth year.
12037584
11759839 amount—100.
6
70559034 int. sixth year.
11759839
11465429 amount—100.
6
68792574 int. seventh year.
11465429
$1115.33.54*m*. amount—100. *Ans.*

Another solution:

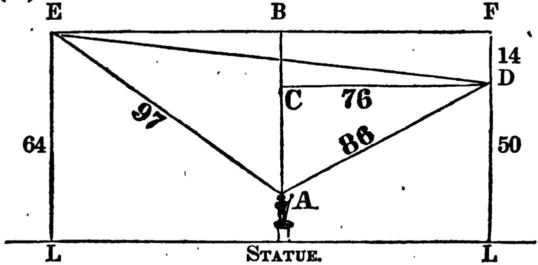
First, $1.06^7=1.5036302$. See table II. Arithmetic.

And $1.5036302\times1300=1954.719$ Amount at Compound Interest.

Also, $8.393837\times100=839.383$. Amount of $100 Annuity for 7 years, table III.

Hence $1954.719—$839.383=$1115 33*cts.* 5*m.* Ans.

(18)



Thus, referring to the above figure.

A B is a perpendicular line erected on the centre of the statue's base, which forms the side A C of the right angle A C D; and the other two sides, A D 86 and C D 76, are given to find the length of the side A C.

$$\text{Now } 76^2=5776\ \&\ 86^2=\begin{array}{r}7396\\ -5776\\ \hline \sqrt{1620}\\ \hline\end{array}\ \text{diff.}(40.2+=AC$$

Then 40.2+14 the difference between the column
=54.2 the whole length of A B. Then $54.2^2=$
2937.64 & $97^2=$

that is A E=9409
−2937.64

$\sqrt{6471.36}$=(80.44+ for E B
+76 that is B F

14=D E ———— 156.44=E B F
14 ———— 156.44

56 ———— 62576
14 ———— 62576
———— 93864
195 ———— 78220
———— 15644

24473.4736
196

$\sqrt[2]{24669.4736}$=157ft. Ans.

NOTE.—This solution supposes the statue to be lower than th columns: admitting it to be higher, the operation will, of course, b different; but may readily be performed from the one here given.

(19) 1*sec.* : 47*sec.* :: 1150*ft.* : 54050*ft.* Ans.

(20) 15*m.* 7*fur.*=83820*ft.*
Then 1150*ft.* : 83820*ft.* :: 1*sec.* : 1*m.* $12\frac{102}{115}$*sec.* An

(21) First suppose $\frac{1}{2}$ of 8.2245 in. to be gold.

4.11225=$\frac{1}{2}$	4.11225 in. of sil.
10.36	5.85
2467350	2056125
1233675	3289800
4112250	2056125
42.6029100*oz.* g.	24.0566625*oz.* sil.
24.0566625	
66.6595725	
63	
3.6595725 error of excess.	

Again suppose $\frac{1}{3}$ of 8.2245 in. to be gold, the rest silver.

2.7415=$\frac{1}{3}$	5.4830=silver.
10.36	5.85
164490	274150
82245	438640
274150	274150
28.401940*oz.*	32.075550*oz.* sil.
32.075550	
60.477490	
63.	
2.522510 error of defect.	

[*See following page.*

Then $3.6595725 \times 2.7415 = 10.03271800875$
And $2.522510 \times 4.11225 = 10.37319174750$

And $2.522510 + 3.6595725 = 6.1820825)20.40590975625(3.3008148$ inches of gold.

```
18.5462475
----------
 185966225
 185462475
 ---------
   503750625
   494566600
   ---------
     91840250
     61820825
     --------
     300194250
     247283300
     ---------
      529109500
      494566600
      ---------
       34542900 rem.
       --------
```

Then $3.3008148 \times 10.36 = 34.196441328$ ounces of gold, and the rest, which is 28.803558672 ounces silver. Ans

Another solution:

First 63 oz.÷8.2245 oz.=7.66 oz. weight of a cubic inch of the mixture.

$$\text{Then } 7.66\left\{\begin{array}{l}10.36\\ 5.85\end{array}\right)\begin{array}{l}=1.81 \text{ proportional } \textit{bulk} \text{ of gold.}\\ =2.7 \text{ proportional } \textit{bulk} \text{ of silver.}\end{array}$$

Also 1.81×10.36=18.7516 proportional *weight* of gold.
And 2.7 × 5.85=15.795 proportional *weight* of silver.

34.5466 sum.

$$\left.\begin{array}{l}\text{Hence } 34.5466 : 18.7516 :: 63 : 34.19587 \text{ oz. gold}\\ \text{And } 34.5466 : 15.795 :: 63 : 28.80356 \text{ silver.}\end{array}\right\}\text{Ans.}$$

Proof 62.99943

(22) Thus 7*lbs.* beef at $5\frac{3}{4}$*cts.*=$40\frac{1}{4}$*cts.*
5 bread at 6 =30
Then $40\frac{1}{4}$*cts.* : $34 50*cts.* : : 30*cts.* : $25 71*cts.* 4*m.*+ Ans.

(23) Thus $\frac{4}{9}$ of $\frac{5}{7}$ of $\frac{362}{463}=\frac{7240}{29169}$.
Then $1-\frac{7240}{29169}=\frac{21929}{29169}$. Ans.

(24)
$
1000
6
60|00 int. for 1 year.
8
$480 int. for 8 years.

Then 8 years.
6 per cent.

48
100

148 amt. of \$100 for 8 years. at 5 per cent.

	\$	\$	\$	\$ cts. m.	
Then	148 :	100 : :	1000 :	675 67 5	the present worth.
				1000 00 0	
				\$324 32 5	discount.
				480 00 0	interest.
			Ans.	\$155 67 5	difference.

(25) $\sqrt{32}=5.656+$
$\sqrt{24}=4.9$

10.556 sum.
$\sqrt[3]{67}=4.06+$

Ans. 6.496 difference.

(26) Thus \$100 : \$105$\frac{3}{5}$: : \$2450 : \$2587 20*cts.* Ans.

(27) Thus the amount of \$500 75*cts.* for 9 months at 6 per cent.=\$533 28*cts.* 4*m.*

cts. $ *cts.*
And 5064×$2\frac{1}{2}$=126 60 price of the boards.
140×13= 18 20 do. tallow.

144 80 amt.
523 28 4

$378 48 4 to receive in flax-seed.

Then as $92\frac{1}{2}$*cts.* : $378 48*cts.* 4*m.* :: 1*bu.* : $409\frac{159}{925}$*bu.* Ans.

(28) 9 yrs.=36 qrs. the sum of terms.
—1

35
3 common difference.

105
+6=1st term.

111 last term.
6=1st term.

117 sum.
×36 number of terms.

702
351

2)4212

$21.06*cts.* due him. Ans.

(29) Thus 5*yrs.* $-2\frac{1}{4}$*yrs.*$=2\frac{3}{4}$*yrs.*
Then $1.06\times1.06\times1.045=1.174162$ divisor.
And 2363.3875÷1.174162=$2012 82*cts.* 9*m.* An

(30) Thus, from January 14th, 1802, till July 5th, 180
inclusive=5 years 173 days. And the amount o
$1854.69 for that time at 5 per cent. per annum=

$2362.3161
285. paid off.

2077.3161 second bond.
$4\frac{3}{4}$

83092644
10386580
5193290

98.67.2514 int. of the 2d bond for 1 yr.

Then 98672514 : 365 : : 52.65 : 194 days the tim
of the second bond.

Now 2077.3161
52.65 interest.

2129.9661 amount.
102.43 paid off.

2027.5361 3d bond.

Which was out from January 12, 1808, till October 26th, 1813, which is 5.789 years.

$2497.0323 last amount.
2027.5361 last bond.

469.4962 gained on the last bond, which was out 5.789 years, and this bond inclusive to the time=11737.4064829.

Then 11737.4064829 : 469.4962 : : 100 : 4 per cent. Ans.

(31) First suppose 10 horses at $50=$500
20 cows 20=400
60 sheep 4=240

$1140 sum.
456

684 error of excess.

Again suppose 8 horses at $50=$400
16 cows 20=320
48 sheep 4=192

$912 sum.
456

456 error of excess.

Then 684 × 8 = 5472
456 × 10 = 4560

Difference of errors = 228)912(4 horses.
912

$ $
For 4 horses at 50 = 200
8 cows 20 = 160 Ans.
24 sheep 4 = 96

$456 proof.

Another solution:

$
First 50 price of each horse.
20 × 2 = 40 price of cows for each horse.
4 × 6 = 24 price of sheep for each horse.

114)456(4 number of horses.
456

$ $
Then 4 horses at 50 = 200
4 × 2 = 8 cows 20 = 160
And 8 × 3 = 24 sheep 4 = 96

456 proof.

(32) Thus

$$\text{Mean rate } 19 \begin{cases} 16 = 5 \\ 17 = 5 \\ 24 = 3+2=5 \end{cases}$$

$$\text{Then as } \overset{oz.}{5} : 10 :: \left\{ \begin{array}{l} \overset{oz.}{5} : 10 \text{ of 17 carats fine.} \\ 5 : 10 \text{ of 24 carats fine.} \end{array} \right\} \text{Ans.}$$

(33) £100 : £120 :: £230 5*s.* : £276 6*s.* the amount in sterling.
Then as £1 : £276 6*s.* :: $4 44*cts.* 4*m.* : $1227 87*cts.* 7*m.*+ Ans.

(34) Thus $\frac{87}{170}+\frac{1}{4}=\frac{518}{680}$, and $\frac{518}{680}$ subtracted from $1=\frac{162}{680}$ =the 27 feet.
Then $\frac{162}{680}$: 27*ft.* :: 1 : 113*ft.* 4*in.* Ans.

(35) $7 : 56¼*cts.* :: $400 : $32 14$\frac{2}{7}$*cts.* Ans.

(36) Thus 30
+96
126 sum.
25 number of terms.
630
252
2)3150
$15.75 Ans.

330
5
.5

5.1
1.8

(37) Thus 4 : 9 :: 47 : 105.75 the greater number.

```
        47
    ------
    152.75 sum.
     58.75 difference.
    ------
      76375
    106925
   122200
   76375
   ---------
Product 8974.0625 Ans.
```

23
13
36

83
10
830

35
30 3/4
655

550
27½
10.07
8
60
1.2

6
4)55
60
5.6

7
60

80
8
5.5
1
4.8

240½
5
7.8

15
.59

4)78
15

THE END.

[illegible] Beckett

||||·||||·||||·||||

||||·|| ½ |

Green [illegible] Laner

||||·||||·||||·|| ½

||||·||||·||||·||||·||||

4 ||||

27½

Tom
27½
27½

7
18
55

44
22
66

4 5

30

2 3 1 0 2

2 3

1
2)6
3